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PROCEEDINGS

OF THE

GEOLOGICAL & POLYTECHNIC SOCIETY

OF THE

WEST RIDING OF YORKSHIRE.

VOLUME V.

1869–1870.

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CENTRAL

PROCEEDINGS

OF THE

GEOLOGICAL AND POLYTECHNIC SOCIETY

Of the West-Riding of Yorkshire,

AT THE SEVENTY-THIRD MEETING, HELD IN THE LECTURE-ROOM OF THE CHURCH INSTITUTE, AT WAKEFIELD, ON WEDNESDAY, APRIL 28TH, 1869.

Dr. HOLDSWORTH (Mayor of Wakefield) in the Chair.

The Chairman having briefly alluded to the origin of the Society at Wakefield, and welcomed the members to the town on the present occasion,

The following gentlemen were unanimously elected members of the Society:—Dr. Holdsworth, of Wakefield; the Rev. Scott F. Surtees, Rector of Sprotburgh; Sir Charles Lowther, Bart., of Swillington House; T. W. Tew, of Carlton Villa, Pontefract; Stephen Seal, of Goldthorpe Hall, Darfield.

The accounts of the Society for the past year were then read, and the officers and committee appointed, as follows:—

STATEMENT OF RECEIPTS AND EXPENDITURE

OF THE GEOLOGICAL AND POLYTECHNIC SOCIETY OF THE WEST-RIDING OF YORKSHIRE.

From October, 1867, to October, 1868.

DR.	£.	s.	d.
By 2 Subscriptions for 1866....	1	6	0
,, 84 ,, 1867....	54	12	0
,, 13 ,, 1868....	8	9	0
	£64	7	0

CR.	£.	s.	d.
By Printing and Advertising ...	18	19	0
,, Philosophical Society for Rent of Museum Rooms ..	10	0	0
,, Collecting Subscriptions	1	10	7
,, Postages	1	8	5
,, Expenses of Meetings	0	14	3
,, Carriage of Parcels and Reports	0	5	9
,, Subscription to the Palæontographical Society	1	1	0
,, Lithographing Plates for Reports	2	3	0
,, Purchase of Sections and Diagrams.....	1	8	0
,, Photographs of Ancient Crosses	0	6	0
,, Stationery	0	2	6
,, General Secretary on Account	26	8	6
	£64	7	0

President.

THE EARL DE GREY AND RIPON.

Vice-Presidents.

THE DUKE OF NORFOLK.
THE DUKE OF LEEDS.
THE EARL OF EFFINGHAM.
THE EARL OF HAREWOOD.
THE EARL OF DARTMOUTH.
THE EARL FITZWILLIAM.
LORD WHARNCLIFFE.
LORD LONDESBOROUGH.
VISCOUNT HALIFAX.
VISCOUNT MILTON, M.P.
VISCOUNT GALWAY.
EDWARD AKROYD, ESQ., M.P.
JOHN WATERHOUSE, ESQ., F.R.S.
W. B. BEAUMONT, ESQ., M.P.
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JOHN SPENCER STANHOPE, ESQ.
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Council.

HENRY BRIGGS, ESQ.
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RICHARD CARTER, ESQ.
T. W. EMBLETON, ESQ.
REV. DR. BURNETT.
DR. SCHOLEFIELD.
WM. CHADWICK.

Honorary Secretary.

WM. SYKES WARD, ESQ., F.C.S.

General Secretary.

HENRY DENNY, ESQ., A.L.S.

Honorary Curators.

J. G. MARSHALL, ESQ., F.G.S.
T. W. EMBLETON, ESQ.

Local Secretaries.

H. C. SORBY, ESQ., Sheffield.
HENRY BRIGGS, ESQ., Wakefield.
DR. ALEXANDER, Halifax.
DR. SCHOLEFIELD, Doncaster.
BENTLEY SHAW, ESQ., Huddersfield.
RICHARD CARTER, ESQ., Barnsley.
REV. DR. BURNETT, Bradford.
DR. PALEY, Ripon.

The Chairman then called on the Rev. John Stanley Tute to read the first Paper.

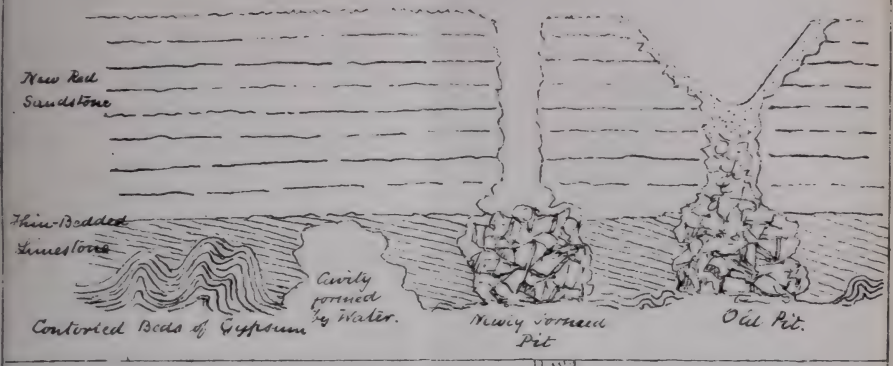
ON CERTAIN NATURAL PITS IN THE NEIGHBOURHOOD OF RIPON.

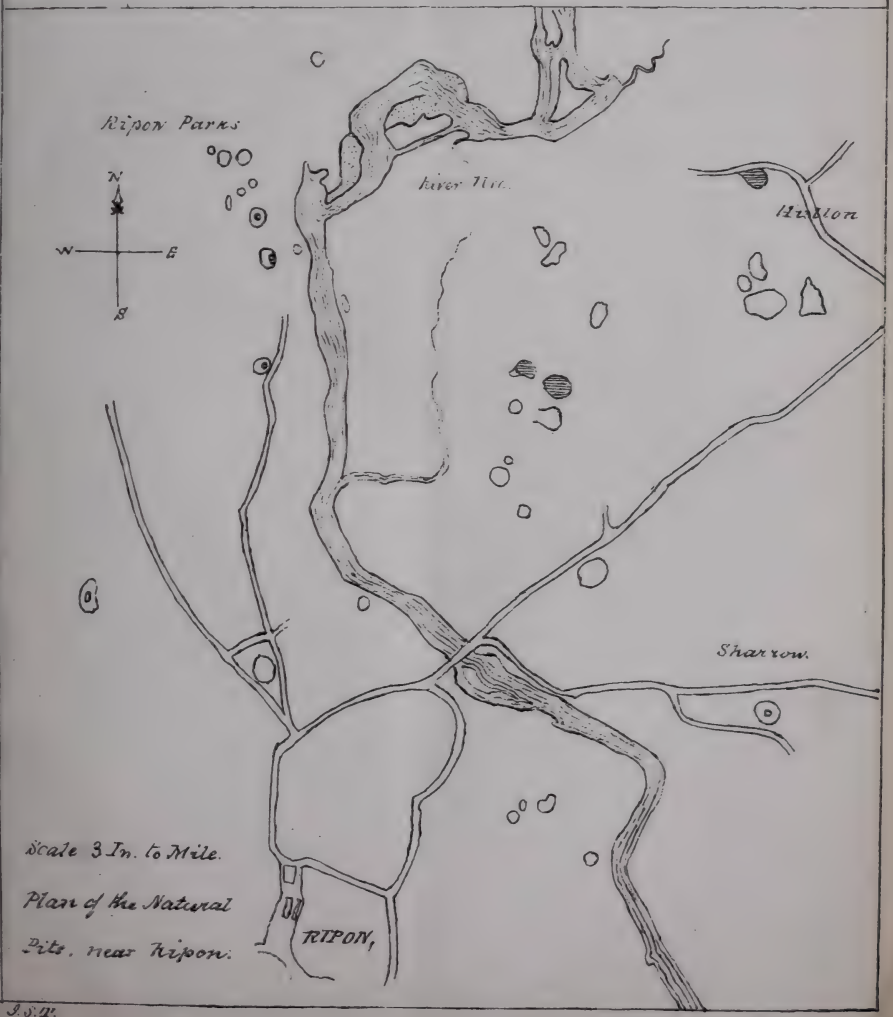
BY REV. JOHN STANLEY TUTE, OF MARKINGTON.

ON the north-east side of the city of Ripon, and within a rectangular area of rather more than a square mile,* there

* They are not, however, confined to this area, though the greater number occur within it.

Diagram shewing the supposed Formation of the Pits.





J. S. A.

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occur many singular pits and depressions in the earth, which have given rise to various speculations as to their origin, and which, I think, are well worthy of the attention of geologists. In form, they are generally crater-like hollows, from fifty to a hundred feet across; and sometimes, though very rarely, large and deep perpendicular shafts. There are about thirty or forty of these regularly-formed depressions. But a large portion of the district has been thrown into a succession of little hills and valleys, in consequence of other irregular subsidences. In some cases these depressions contain water, though the greater number are dry. They seem all originally to have been formed as shafts; their present crater-like form being clearly due to the subsequent falling in of the sides. They generally, if not universally, occur within half-a-mile of the river Ure, which at this point flows round an escarpment of the new red sandstone. And another pit of the same character, about three miles from Ripon, in the village of Bishop Monckton, is also within a short distance of the river. One would naturally suspect, then, that the river had had something to do with their formation. This suspicion becomes strengthened when we come to examine the depth of the pits. In a shaft on the eastern side of the railway there is water at the bottom at the depth of 64 ft. 6 in., the width of the shaft being 41 ft. During dry seasons the water disappears, and at the bottom are seen the fallen rocks of the new red sandstone, through which the shaft is formed. As there must have been once a considerable hollow, now filled up with the sandstone rock, the true,—*i. e.*, original,—bottom of the pit must have been very much lower down—certainly more than seventy or eighty feet below the surface. Now the level of the river is about eighty feet below the top of the pit. So that here, in a pit which is one of the most distant from the river, we seem to be able to trace a connection between the two.

Some of these pits are of ancient date, but others have been formed recently. The one which I have just mentioned fell in during the month of June, 1836; and another on the opposite side of the river, even more recently—in the spring of 1860. The subsidence was noticed by the Rev. F. H. Dunwell, who has kindly furnished me with the following particulars. He was near the river-side with some of his pupils, watching some men who were fishing, when he heard a loud noise like thunder, and on looking round, he saw at a little distance a mass of earth and stones rising into the air, and falling back again. One of the men who were fishing went near, and found that a pit had been formed, in which was a quantity of water in a state of ebullition. It continued in the same disturbed state during the following day. Then the sides began to give way and to fall in rapidly, and the water subsequently disappeared. At present, one side of the shaft is perpendicular, the other side is broken in and slopes to the bottom. The depth of the pit on the day after it was formed was sixty-nine feet; the width, twenty-two feet; and the depth of water, twenty-seven feet.* It is cut through the uppermost strata of the magnesian limestone, here thin-bedded and in small slabs; but lying undisturbed with a gentle dip eastwards of five or six degrees. At a very short distance, and on the same side of the river, there are some beds of gypsum, which seem to pass beneath the magnesian limestone, and probably correspond with those beds of "lower red marl and gypsum" which Professor Sedgwick has traced "from the confines of Nottinghamshire to the south bank of the Wharfe, near Tadcaster." † He says, "The deposits of gypsum near Ripon may belong to the lower red marl and gypsum, or they may be subordinate to the lower part of the

* For these measurements I am indebted to Mr. Heslington, of Ripon.

† *Geol. Trans.*, 2nd series, vol. iii., p. 101.

upper red sandstone."* I think that most probably the former supposition is the true one, and that these pits are caused by the washing away of the red marl and gypsum by subterranean streams connected with the river. For the gypsum beds occur both here and at Bishop Monckton, where another pit has been formed. In the section exposed on the right bank of the Ure, the gypsum beds are very much contorted, and if this be a general condition of these beds in this district,† it is easy to see how readily their substance would be removed by the continual waste of running water, so as to leave at every place where these subterranean streams occur, dome-shaped caverns in the magnesian limestone, the uppermost beds of which, I think, overlie these gypsum beds.

It is worthy of notice that these pits seldom occur singly; but generally they are found in groups of two, three, or four. This grouping seems to be due to two or more neighbouring folds of the strata which one after the other have been hollowed out; for when the subterranean stream has spent its strength upon one contortion, and brought down into the hollow which it has made the overlying rock, it will naturally attack with greater effect the neighbouring contortion, rather than the harder rock of the new red sandstone, which has taken the place of the first.

Besides the two pits which I have mentioned, several others have been formed in the memory of persons now living. At Sharrow, one fell in during the night, about twenty years ago, and alarmed the inhabitants of a neighbouring house, who found in the morning little more than the breadth of the road between themselves and the pit. About forty years ago, some men at Bishop Monckton were making

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* *Geol. Trans.*, 2nd series, vol. iii., p. 110.

† The upper beds of this series near Ferrybridge are *contorted*. See *Geol. Trans.*, p. 101.

a stack near the old Hall, and had left it for a while; on their return they found that the ground had given way beneath the stack, which had disappeared. The men hastened in great consternation to their master, exclaiming, "It's gone! It's gone!" The hole still remains a receptacle for rubbish.

The following copy of a well-sinker's report will, I think, show how a pit may be formed in the new red sandstone, when a sufficient hollow has been formed below, and the limestone roof of the hollow gives way, for it shews that the new red is not a very coherent mass of rock:—

"The well is sunk on the top of Hutton Bank, and is 28½ yards deep. After cutting through the soil, which is not very thick, a soft, sandy, red rock, ten feet thick, was penetrated, and then a layer of soft marly clay, about ten inches thick. These clay layers occurred about every ten feet of rock. The rock was much harder as the shaft descended, and alternated red and white. The rock is not laid in horizontal layers, but is what well-sinkers call 'eddy-rock;' and not all inclining one way, but crossing one another with great irregularity, and at various angles of descent."*

I think, then, that these curious pits are due to the wasting away of the red marl and gypsum beds, rather than of the more solid beds of magnesian limestone which lie below, and that their occurrence in the neighbourhood of these gypsum beds is a strong presumption that such is the case. There are many caves indeed in the magnesian limestone, but they are not, as far as one can tell, large dome-shaped hollows, but long tortuous cracks and windings, often reaching to the surface, and forming along the streams which run over the limestone frequent swallow-holes, of no great size in themselves, but still in summer-time capable of taking in the whole of the streams, if they were not carefully stopped up.

* I am indebted to the kindness of Mr. H. Thirlway, bookseller, Ripon, for this "Copy of a Well-sinker's Report."

There was a remarkable fact observed by Mr. Dunwell which deserves notice, viz., that the rock was seen to rise into the air at the time of the formation of the pit. This has been supposed to shew that these pits are due to some chemical process going on in the earth, by which a large quantity of gas is suddenly set free, and in this manner the hole is *blown out*. Such an explanation, however, scarcely agrees with the fact that all the materials of the pit fall to the bottom, and not any are thrown out. What Mr. Dunwell saw may be accounted for by supposing that the first fall of the rock, which produced the sound like thunder, caught and compressed a certain amount of air, which immediately afterwards, finding vent, threw upwards a quantity of earth and stones.

A Paper was then read by Mr. Lawson Tait, of Wakefield, entitled "Recent Speculations on Primæval Man," which, as it was of a partly controversial character, has not been forwarded for publication.

REMARKS ON THE EXTINCT FAUNA OF THE EAST RIDING OF YORKSHIRE. BY MR. EDWARD TINDALL, OF BRIDLINGTON. [READ BY MR. DENNY.]

In that part of the western boundary of the German Ocean between Flamborough Head and Spurn Point, is situated a tract of low land called Holderness, which, in early times, exhibited the alternate appearance of morass and lake, as the river Hull overflowed or subsided in its progress to the Humber. Trees and shrubs sprung up in the uncultivated land, and, spreading by degrees, formed large forests, which, confining the exhalations of the soil and obstructing the course of streams, caused the rivers to overflow, and stagnate into lakes and marshes. A great

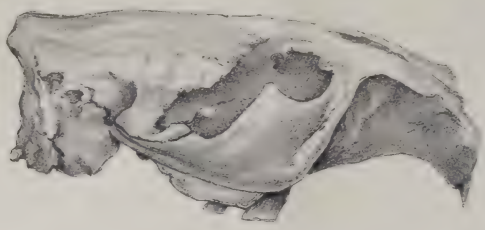
many of the marshes and the woods of Deira remained at the time of the Domesday survey, for its waters were "so abundant as to afford a fishery of 70,000 eels, and wood pastures eleven miles long and three miles broad."

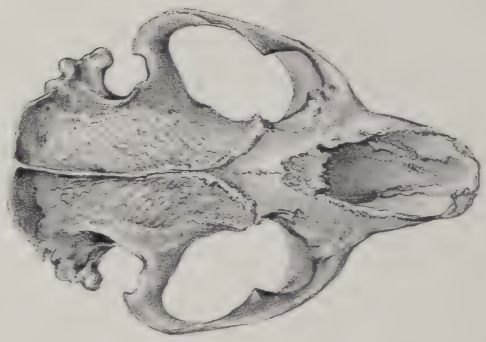
Most of the towns within the area here spoken of are, like the land, wet and damp. Woodmansea, near Beverley, and Rotsea, near Watton, bespeak the existence of meres in those places. Indeed, Watton—Saxon *Wētadun*—signifies a *wet town*, describing its situation as surrounded with waters and marshes. Skip*sea*, Withern*sea*, and Kiln*sea* indicate that a mere has existed in each of these places, as there is yet at Horn*sea*. The termination *sea* (or *sey*, as it is occasionally spelt) is not the modern word denoting the *ocean*, but is nearly synonymous with mere.

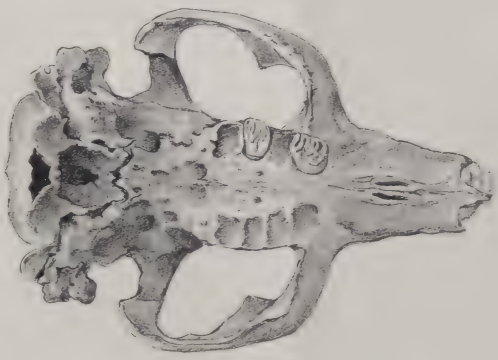
From the above remarks, it will be evident that the physical geography of the district, diversified as it appears to to have been by forests, lakes, and morasses, was eminently favourable to the habits of such mammals as those whose remains are now found buried in its bogs. The beaver had its natural haunts in the lake solitudes of Holderness; while the elk, gigantic deer, and reindeer would have the shelter of the primæval forests which then abounded in East Yorkshire; and from these sources an abundance of food for each tribe was always available.

The neighbourhood and coast of Holderness possesses much local interest, from the various relics of a geological or archæological nature which occur there, such as stone axes, stone hammer-heads, and rude canoes formed from the hollow stems of trees by the primæval inhabitants of the district; as also the remains of several extinct animals, which have enriched the museums of the late Mr. Strickland and myself, the latter of which contains bones of the *elephant*, *bear*, *elk*, and *deer*.

Amongst the most interesting remains of animals which







have been discovered in Holderness, may be enumerated those of the *Beaver, Elk* or *Moose deer,* and *Reindeer*—three species of mammals new to the Extinct Fauna of Yorkshire. Of the former animal, a very fine skull was exhumed during some extensive draining operations on the banks of a river near Wawne, in the neighbourhood of Beverley, in 1861, by Dr. Brereton, and who has kindly allowed the specimen to be exhibited at this meeting. The skull, it will be observed, has every indication of having belonged to a mature individual; measuring six inches in length, and four inches in width across the posterior part of the zygoma. The nasal bones, one incisor, and six of the molar teeth are wanting; in every other respect the skull is in a fine state of preservation, and deeply coloured by the peat.* Previous remains of this singular rodent have been found in lacustrine formations in *Scotland, Wales, Northumberland, Berkshire, Cambridgeshire,* and *Norfolk;* and it is very evident the beaver existed in Britain down to historic times, as the names of many places are derived from some peculiarity of the site in connection with that animal, as Befer-burne or Bever-brook, Befer-ige and Beferic, Bever-island, and Befer-lac or Bever-lake or fence; so evidently referring to the ordinary habits of the beaver as to prove its existence in the localities so named at that period. Leland, writing in the early part of the 16th century, mentions the town of Beverley, in Yorkshire, as not only having for its arms the animal "quod vocatur bever," but afterwards, on the authority of a writer of the life of St. John of Beverley, gives the name of the town as derived from that animal, which abounded there:—"Dierewald locus nemorosus, id est sylva Deirorum, postea Berlac, quasi locus, vel lacus castorum, dictus a castoribus, quibus

* For the different views of the skull in the accompanying plate I am indebted to Mr. Hanson, photographic artist, of Leeds.

Hulla aque vicina abundabat" (tom. iv., pp. 34-100).* The correctness of this tradition, however, like many others, although very probable, has been questioned. Professor Phillips says Beverley, instead of being Bever-lac, owing its name to beavers and lakes, is simply Pedwar-llech, the Greek Petouaria, chief city of the Parisoi, from whence we have Bevorlac and Beverley.† Our specimen, therefore, possesses peculiar interest, both *geological* and *historical*, as being not only the first instance of the remains of the beaver which has been found in Yorkshire, but also as corroborating the former tradition of its actual existence in the neighbourhood of Beverley at remote periods, and therefore giving some plausibility to the name of the town.

When, however, it became extinct in Britain it is not so easy to determine; but that it was beginning to be scarce in the 9th century is evident, as Pennant cites a passage from an early record—the Leges Wallicæ, or the Laws of Howel the Good—to show the value of a beaver's skin was 120*d.*, while that of an otter was only 12*d.*; and again, we find that in the reign of Henry I., in the 11th century, an export duty of 4*d.* per skin was authorised to be levied at *Newcastle-upon-Tyne*—a large amount in those days.

The second animal whose remains I have to record as a former inhabitant of Yorkshire, is the Elk or Moose deer *(Alces malchis)*, which has occurred in two instances. In the spring of 1822, as some workmen in the employ of Messrs. G. and W. Tindall, nursery and landscape gardeners, of Beverley, were employed in digging out some drift gravel to construct a lake at Thorpe Hall, near Bridlington, the seat of Lord Macdonald, they found, at the depth of about four and a half feet from the surface, some of the bones and the

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* Bede called the place where Beverley now is, Sylva Deirorum; Anglicè, Deirewald, p. 42.

† *Rivers, Mountains, and Sea Coast of Yorkshire*, pp. 105-201.

horns of the Elk (the largest of the Cervine family which still exists on the surface of the globe), and also a fine horn of the stag or red deer; and in the month of February, 1868, a horn and the occipital portion of the skull of a female specimen of the Elk were found during the process of draining, in a peat bog, about two feet below the surface, on the property of Sir George Cholmley at Carnaby, near Bridlington; and it is very probable the remaining parts of the skeleton of one of these animals may still be entombed in the same locality. Although the bones of this noble animal are said to have been found in different parts of the kingdom, the first authentic instance is in the *Transactions of the Tyneside Natural History Club* for 1861 (vol. v., pt. xi., p. 111), which contains a paper on the discovery of a fine shed horn of the Moose deer or true Elk at Chirdon Burn, North Tyne, near the bottom of a peat formation, resting partially on the coarse gritty marl formed by the weathering of the subjacent strata. Mons. Lartet detected a lower jaw of the Elk amongst other mammalian remains found in the cave of Llandebie, in South Wales, in 1861. There is a statement that in 1710 the horns of a Moose deer were dug up out of an old pond at Mainfort, near Sedgefield; and also that in 1827 a very fine specimen of an elk's horn was dug up in the vicinity of West Water, near Chatteris, in Cambridgeshire. From the date, however, given (1822), it will be evident the Yorkshire specimen is the first reliable example on record of the *moose* occurring in Britain, as Professor Owen does not include it in his *History of British Fossil Mammals,* published in 1846, or in his *List of Fossil Mammals* in the *Reports of the British Association;* which he most undoubtedly would have done had these instances been authenticated. I therefore suspect that in both the cases alluded to the horns have been of the large red deer or of the Megaceros, and not those of the true Elk,

as the term elk was formerly indefinitely used for any large deer's horns, without their precise identity having been determined—a point very easy to decide by a competent authority.

Although we have no historical records of the former existence of the Elk in Britain, it is enumerated by Cæsar as living in the great Hercynian forest during the Roman period; since which, by the destruction of the ancient forests and other effects of civilization, the Elk, like many of its contemporaries, has entirely disappeared from its early haunts, except Northern Europe, Northern Asia, and the wooded districts of Canada and the United States. It appears to have been well known to the lake dwellers in Switzerland, amongst whose rejectamenta its remains occur, and from which district it has, however, also long since disappeared.*

The third addition to the Extinct Fauna of the East Riding of Yorkshire is of another interesting species of the same family—the Reindeer. In 1860 I found, at the base of the cliff, in a lacustrine deposit near the top of the lake at Skipsea, the horn of the Reindeer, and also of the large variety of the Red deer, both of which are now in my possession.

It is somewhat remarkable that the three animals to which I have called attention, as formerly inhabitants of East Yorkshire, are all of strictly *boreal* habits, and afford evidence, as Mr. Boyd Dawkins observes, "that the climate of Pleistocene Britain was more severe than it is now; that at a time when Britain formed a portion of the Europæo-Asiatic continent, it more closely resembled that now obtaining in the fur-countries of Northern Asia than elsewhere." As connected with this portion of my subject, I cannot

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* *The Lake Dwellings of Switzerland and other parts of Europe*, by Dr. F. Keller; translated by J. E. Lee. 1866.

conclude better than by quoting the following apposite remarks by a writer in *Land and Water*, signed "Alces":—

"The study of northern zoology presents a variety of considerations interesting both to the student of recent nature and to the palæontologist. Taking as well-known instances the reindeer and musk ox, there are forms yet inhabiting the Arctic and sub-Arctic regions, which may be justly regarded as the remains of an ancient Fauna which once comprised many species now long since extinct, and which, with those already named, occupied a far greater southerly extent of each of the continents converging on the pole than would be possible under the present climatal conditions of the world. With those great types which have entirely disappeared before man had recorded their existence in the pages of history, including the mammoth *(Elephas primigenius)*, the most abundant of the fossil pachyderms, whose bones so crowd the beaches and islands of the Polar Sea that in parts the soil seems altogether composed of them, the *Rhinoceros tichorinus*, and others, were associated genera a few species of which lived on into the historic period, and have since become extinct; whilst others, occupying restricted territory, are apparently on the verge of disappearance. 'All the species of European pliocene bovidæ came down to the historical period,' states Professor Owen, in his *British Fossil Mammals*, 'and the aurochs and musk ox still exist; but the one owes its preservation to special imperial protection, and the other has been driven, like the reindeer, to higher northern latitudes.' Well authenticated as is the occurrence of the rangifer as a fossil deer of the upper tertiaries, the evidence of its association, in ages so remote, with *Cervus alces*, has been somewhat a matter of doubt. The elk and the reindeer have always been associated in descriptions of zoology of high latitudes by modern naturalists, as they were when the boreal climate, coniferous forests, and mossy bogs of Ancient Gaul brought them under notice of the classic pens of Cæsar, Pausanias, and Pliny. And there is something in common to both of these singular deer which would seem to connect them equally with the period when they and the gigantic contemporary genera, now extinct, roamed over so large a portion of the earth's surface in the north temperate zone, where the fir-tree—itself geologically typical of a great antiquity—constituted a predominant vegetation.

"The presence of the remains of *Cervus alces* in association with those of the mammoth, the great fossil musk ox *(Ovibos)*, the fossil reindeer, and two forms of bison, in the fossiliferous ice-cliffs of Eschscholtz

Bay, as described by Sir John Richardson, would seem to be an almost decisive proof of its existence at a time when the temperature of the shores of the Polar Sea was sufficiently genial to allow of a vegetation affording forage and cover to the great herds of mammals which have left their bones there with buried fossilized trees, attesting the presence of a forest at a latitude now unapproached save by shrubs such as the dwarf birch, and by that only at a considerable distance to the south.

The elk of the present day, so far as we understand his habits, unlike the musk ox or reindeer, for which lichens and scanty grasses in the valleys of the barren grounds under the Polar Circle afford a sufficient sustenance, is almost exclusively a wood eater, and could not have lived in the locality above indicated under the present physical aspects of the coasts of *Arctic America*, any more than the herds of buffaloes, horses, oxen, and sheep, whose remains are mentioned by Admiral Von Wrangel as having been found in the greatest profusion in the interior of the islands of New Siberia, associated with mammoth bones, could now exist in that icy wilderness. On these grounds, therefore, a high antiquity is claimed for the sub-genus *Alces*, probably as great as that of the reindeer.

"Passing on to pre-historic times, when the remains of the species found in connection with human implements prove its subserviency as an article of food to the hunters of old, we find the bones of *Cervus alces* in most of the Swiss and other Lake Dwellings, and in refuse-heaps of that age; whilst in a recent work on travel in Palestine, by the Rev. H. B. Tristram, we have evidence of the great and ancient Fauna which then overspread temperate Europe and Asia having had a yet more southerly extension; for he discovered a limestone cavern in the Lebanon, near Beyrout, containing a breccious deposit teeming with the *débris* of the feasts of pre-historic man—flint chippings evidently used as knives, mixed with bones in fragments, and teeth, assignable to a reindeer, a bison, and an elk. 'If,' says the author, 'as Mr. Boyd Dawkins considers, these teeth are referable to the now exclusively northern quadrupeds, we have evidence of the reindeer and elk having been the food of man in the Lebanon not long before the historic period; for there is no necessity to put back to any date of immeasurable antiquity the deposition of these remains in a limestone cavern. And,' he adds, with significant reference to the great extension of the ancient zoological province of which we are speaking, 'there is nothing more extraordinary in this occurrence than in the discovery of the bones of the tailless hare of Siberia in the breccias of Sardinia and Corsica.'"—Vol. v., No. 119. p. 233.

ON A NEW CARBONIFEROUS LABYRINTHODONT FROM THE NEIGHBOURHOOD OF BRADFORD. BY MR. LOUIS C. MIALL, CURATOR OF THE BRADFORD PHILOSOPHICAL SOCIETY.

Remains of amphibia are by no means rare in the coal-shales of the British Isles, and so many specimens of vertebræ, scales and teeth, belonging to this class, are found under various names in most of our museums, that it is a little strange that the genera archegosaurus, anthracosaurus, pholidogaster, and the rest, are so unfamiliar, and that writers on general geology go on repeating that no vertebrata higher than fishes are found in the coal-measures of Britain. The museum of the Bradford Philosophical Society contains many fragments of batrachians, which have been assigned to various fishes, some of them by eminent authorities. About a year ago, I placed a number of these aside for special examination, finding such peculiarities among them as bicipital ribs, vertebræ with well ossified apophyses and labyrinthodont teeth. The literature of this subject is so scanty and so recondite that I was unable to identify these remains with any described carboniferous amphibia, nor did the national museums throw any clear light upon the subject. At this time a few fragments, comprising several vertebræ and ribs identical with some already in my possession, were brought to me by an intelligent miner from Dudley Hill, who held out a hope of recovering further remains of the same animal. The remains were discovered in the roof of the Black Bed Coal at Toftshaw, near Bradford. After much delay and a good deal of labour (for the specimen was discovered in the roof of a coal-seam which had yet to be worked), a fine fossil, nearly six feet in length and in fair preservation, was recovered. Twenty-six vertebræ, eighteen ribs, a well-marked skull showing forty-two teeth, and a very large number of scales, were

found in something like their proper relative position. This fine specimen has been sent for description to Professor Huxley, and a notice of it will appear in the next volume of the Geological Society's Journal. Judging from the similar remains in the British Museum and in the Museum of Practical Geology, the species is as yet unknown. It is nearly allied to *Pholidogaster*, but will probably be distinguished from the only species of that genus. While waiting for a full and authoritative account, I have thought that this interesting fossil from the Yorkshire coalfield merits a notice in the memoirs of this Society. I shall be glad if the few remarks I can at present offer may stimulate our local palæontologists to search more diligently than hitherto among the osseous remains which they have hitherto assigned to megalichthys, or other sauroid fishes. I am fully persuaded that the bones of labyrinthodonts are in this neighbourhood, at all events, more common than any others, and it may fairly be expected that many points at present obscure will be elucidated whenever the general atmosphere of puzzle which prevails respecting the identification of carboniferous amphibia shall be fairly dispelled.

The specimen which I have to describe is somewhat irregular in the disposition of the various parts. As in liassic saurians, and other vertebrate remains, a certain amount of displacement has occurred. The cranium, with its beautifully sculptured ganoid plates, is apparently nearly perfect. The upper jaw exhibits an external row of eighteen teeth, the internal row, which doubtless studded the palatine aspect of the vomer, being unseen. The lower jaw is divided into halves, which together contain twenty-four teeth. The coracoids, as in archegosaurus, are represented by two flat rhomboidal plates. This is the only relic of either thoracic or pelvic limbs, but it is conclusive as to their existence. The under surface of the body has been evidently defended by

broad bony plates, three in number, of which the two outer partly conceal the medium one, their internal edges diverging backwards. The vertebræ visible are twenty-six in number, and average about an inch in diameter of centrum. They are biconcave, and the short sides are slightly concave, with a very distinct rugose marking. The neural arch seems to have been very small in proportion to the size of the centrum, as is always the case with cold-blooded animals. In some of the detached vertebræ the processes are entire, but in most they are detached from the centrum, having been imperfectly ossified. I infer from this and other indications that the animal whose remains are now, after so long an interval, disinterred, was not adult. The spinous process, the zygapophyses, and the pleurapophyses are well seen. Eighteen ribs have been found. These all present the interesting character of a double articulation. The tubercle and capitellum are in many cases perfectly distinct. Both facets probably articulated with the pleurapophyses of the vertebræ. The specimen further exhibits about seventy-four well-marked scales. These are about an inch and three-quarters in length, and are crossed diagonally along the greater part of their length by a rounded ridge. The rest of the scale is flattened. At one end the scale is prominent; the other end in all cases thins away gradually. The scales were doubtless imbricated and arranged along the ventral surface as in *Pholidogaster*. These scales are osseous, and comparable to the scales of ganoid fishes. The teeth are about three-quarters of an inch in length, striated near the base, inserted into and partially anchylosed to shallow sockets. A section shows the rudimentary form of a labyrinthodont tooth, radiating, but not as yet sinuous, folds of cement penetrating the outer half of the substance of the tooth. Further details must be reserved for the completer examination to which our specimen will, I hope, soon be

subjected. It will be seen that the most important facts are readily accessible. We have to regret the loss of the orbits, the limbs, and the tail.

Any discussion of the probable affinities of this specimen with other recent or fossil forms of life is so closely connected with those details which have been brought to light by previous discoveries of a similar kind, that it will be as well to recapitulate briefly what is already known of carboniferous amphibia. The first remains of this kind were found in the clay slate of the upper Bavarian coal-measures, in the Saarsbruck coalfield, and in the Brandschiefer of Münster-appel, in Rhenish Bavaria.* The genus *Archegosaurus* was established by Goldfuss upon characters derived from these specimens. The chief points in which that genus differs from our specimen are these:—Archegosaurus has a notochordal or imperfectly ossified vertebral column, and the occipital condyles are also cartilaginous. There is much resemblance between the two in other points—such as the general characters of the skull, the three pectoral plates, the natatory limbs, and the labyrinthoid teeth. Goldfuss was inclined to refer Archegosaurus to the reptiles proper. This view was opposed by Professor Owen, who pointed out its affinities with the perennibranchiate batrachia, and placed it in his order *Ganocephala*. The interesting discussion in Owen's Palæontology should be consulted by those who wish to know the grounds of this decision. More recently a numerous series of amphibia has been disinterred from the Airdrie black-band ironstone, from the Gilmerton limestone, and from the Kilkenny coalfield. These have been all figured and described by Professor Huxley, whose memoirs in the *Geological Journal* (1862, 1863) and in the *Transactions of the Royal Irish Academy* (vol. xxiv.) now constitute

* Goldfuss, Neues Jahrbuch fur Mineralogie, 1847. Hermann von Meyer, Palæontographica, 1849. Bd. 1. Burmeister, Zeitschrift für Zoologie, 1848. Bd. 1.

an indispensable part of the literature of this subject. A fine skull, 15 in. by 12 in., exhibiting the under or palatine aspect, with numerous broken teeth in two rows (many of the teeth presenting radiating involutions of the pulp cavity) furnished the new genus *Anthracosaurus*. To this genus were also referred a vertebra and rib found in the same bed in the Airdrie coalfield, which had previously furnished the skull. These last remains are identical with those attached to the Low Moor fossil, and from our recent discovery we shall be in a position to decide that they are quite distinct from the type skull of anthracosaurus (now preserved in the Museum of Practical Geology). A number of interesting specimens, comprising a land mollusk *(Pupa vetusta)*, a chilognathous myriapod (*Xylobius)*, and various reptilian remains, have been found at different times by Dr. Dawson within hollow trunks of sigillaria, in the coal-measures of Nova Scotia. These have been described by Professor Owen *(Geol. Journal*, 1860). Although the American specimens unquestionably are nearly related to some of those already mentioned, the disastrous and discreditable strife carried on by our two greatest comparative anatomists renders them unwilling to cite each other's labours, and a satisfactory *resumé* of the whole question seems at present impossible. A new amphibian (pholidogaster) in fair preservation, and throwing much light upon our subject, may be seen in the British Museum. A description and figure by Professor Huxley will be found in the *Geological Journal* (1862). Pholidogaster exhibits well ossified vertebræ and an arrangement of ventral scales very like archegosaurus. Messrs. Hancock and Atthey have also found in the Newcastle coalfield numerous remains of labyrinthodonts, one of which, named by them *Pteroplax cornuta*, is nearly allied to the present form. Dr. Young and Mr. Thomson have added various new species from the neighbourhood of Glasgow, fuller details of which are promised.

It is as yet very difficult to compare the scattered and imperfectly known remains which are daily discovered. Lastly, five new genera of amphibia have been discovered in the Kilkenny coalfield. These are described and figured in vol. xxiv. of the Royal Irish Academy, by Professor Huxley. An abstract of this paper is to be found in the *Geological Magazine* for April, 1866. In all, three genera of vertebrata higher than fishes have been found in the carboniferous strata of Germany, viz., archegosaurus, sclerocephalus, and apateon; six are described from Great Britain, viz., parabatrachus, anthracosaurus, loxomma, pholidogaster, pteroplax, and anthrakerpeton; five from the Kilkenny coalfields, viz., urocordylus, ophiderpeton, ichthyerpeton, keraterpeton, and lepterpeton; and five from Nova Scotia, viz., baphetes, raniceps, dendrerpeton, hylerpreton, and hylonomus. How many of this formidable list will stand the tests of time and further investigation is most uncertain.

Nearly all the peculiarities which I have enumerated serve to approximate our specimen to archegosaurus and the triassic labyrinthodontia. The position of the whole group is somewhat disputed. You are familiar with the toad-like restoration of labyrinthodon which Professor Owen has put forth. You are, perhaps, also aware that Professor Huxley (on this point as on most others) entertains a different opinion, assigning to labyrinthodontia a distinct order of amphibia, co-ordinate with batrachia, sauro-batrachia and ophiomorpha, and ranking the labyrinthodonts as urodele rather than anourous. If we accept this provisional arrangement, we have a group (labyrinthodontia) characterised by the hard, polished and sculptured cranial plates, two sets of teeth (vomerine and palatine) in the roof of the mouth, three pectoral plates, bi-concave vertebral centra, weak, natatory limbs and labyrinthoid teeth. This order is further divided by Professor Huxley into two sub-orders: *mastodonsauria*,

including anthracosaurus and the triassic labyrinthodonts, and specially distinguished by their well ossified vertebral column, and the presence of two occipital condyles; and *archegosauria* (archegosaurus, pholidogaster, &c.) in which the vertebral column is notochordal, and the occipital condyles either cartilaginous or wanting altogether. This classification will be understood at a glance by the aid of the appended table:

AMPHIBIA (Batrachia of Cuvier).

Batrachia.
Saurobatrachia.
Ophiomorpha.
Labyrinthodontia.
Archegosauria (Ganocephala, Ow.)
Mastodonsauria (Labyrinthodontia, Ow.)

This imperfect account must suffice for the present. I hope, with Professor Huxley's assistance, to bring fresh details to light. All such fuller information, with any necessary corrections of the present hasty sketch, will be found in the forthcoming volume of the Geological Society. Let me urge any members of this society who have in their possession vertebrate remains from the Yorkshire coalfield to study them afresh, and search particularly for those batrachian characters which are so easy to detect in almost any fragment. The relations of the carboniferous and triassic labyrinthodontia have been discussed with reference to the doctrine of progressive modification, and as the specimen just described throws additional light upon this important inquiry, a few words on the subject will, I trust, be pardoned. Lamarck's views on the transmutation of species, though so crude and unsupported by adequate evidence, have long exercised an important influence on geological speculation. It has been asserted over and over again that the fossil remains of successive strata exhibit an uniform advance in degree of organi-

sation; and this teaching has been widely spread by the writings of Cuvier, Owen, Hugh Miller, and Murchison. It has been common to point to the notochordal vertebral column of palæozoic fishes, to the ichthyic characters of the liassic reptiles, to the numerous identical body-segments of the trilobites, and ask whether all this does not imply an embryonic and undifferentiated grade of life as characteristic of early geological periods. But these views will be put to a fair test if we compare nearly allied animals and plants of different ages, noting their resemblances and differences, and estimating their modifications with reference to progressive development. Do we find the Silurian *calymene* to be more embryonic than its Devonian congener? Are any more recent trilobites so highly differentiated as *agnostus?* Are the carboniferous representatives of the order in any respect more perfect than those of Cambrian age? Or take the brachiopoda—what mesozoic or tertiary form is so complex as the palæozoic *spirifera?* In what particulars does the *waldheimia* of our Australian seas exhibit a higher organisation than the *waldheimia* of the oolite? Among fishes—to what more differentiated forms have the palæozoic ganoids given origin? What evidence do forms of long duration, such as *lepidotus* and *beryx*, give of progressive improvement? Examined in this manner the generalisation would soon take a different shape. Professor Huxley has briefly reviewed the evidence in his anniversary address to the Geological Society (1862). Among invertebrata he finds no support for the doctrine. Of the vertebrata two groups seem to furnish satisfactory examples of progressive modification of the vertebral column, in correspondence with geological age, viz., the pycnodonts among fishes and the labyrinthodonts among amphibia. Professor Huxley rests the latter part of his decision upon the fact that, while the carboniferous archegosaurus had very imperfectly developed vertebral centra,

the triassic mastodonsaurus had the same parts completely ossified. The only other cases cited in the same address as affording apparent confirmation to the doctrine of progressive development are the dentition of anoplotherium as contrasted with that of recent artiodactyles, and the advance in degree of ossification of some cartilaginous fishes and some crocodilia and lacertilia. It is worth notice that the case of the labyrinthodonts upon which the chief stress is laid, has since the delivery of this address broken down altogether. We can now show from the specimen just described that the vertebral column of the carboniferous labyrinthodont is as well ossified as that of any of its triassic allies. Pholidogaster also exhibits osseous vertebral centra, so that we can fairly say (if Mr. Huxley's summary of the evidence be reliable) that of three-fourths of the examples cited, one-half are already shown to be fallacious. It would be wandering too far to pursue this subject any more. The present condition of geological discovery, while not disproving the theory of descent with modification, which is on other grounds so probable, seems to discourage all attempts to refer the present life of the earth to a single germ developed in the remote past. If we must use metaphors, perhaps the most appropriate would be—divergence in all directions from an undifferentiated axis, the length of the axis indicating the geological relation. Should this view be advanced with those proofs which the present position of palæontology affords, I hope it may be discussed with that impartial and searching scepticism which is so necessary for the attainment of scientific truth.

NOTE.—*Sept.*, 1869. A description of this fossil, accompanied by drawings of some of the details, will be found in No. 99 of the *Geological Journal*. Professor Huxley thinks it best to recognise the fossil as a new generic and specific form, for which he proposes the name of *Pholiderpeton scutigerum*.

ON THE OCCURRENCE OF FLINT IMPLEMENTS AT ADEL, NEAR LEEDS, WITH SUGGESTIONS AS TO THE PROBABLE PERIOD OF THEIR DEPOSIT. BY HENRY DENNY, A.L.S.

The occurrence of flint implements at the present day in such a variety of localities has caused considerable doubt in the minds of some persons as to the authenticity of the articles so found, which in certain instances may not be without grounds for suspicion, since the notorious fabrications of Flint Jack have been spread through the country. In all such cases, however, there are certain facts to be taken into consideration, and precautions necessary to be kept in view, before conclusions can be arrived at with any degree of probability. Such as the following:—

In the *first* instance, Are the *localities* where such objects have been found those that are known to have been occupied by the Britons, Saxons, or other colonists of this island; or have the articles been found in the tumuli or earthworks of these early races, and with whose remains they may have been interred? and, *secondly*, the material of which they are generally made, does it occur *geologically* in the neighbourhood? If not, then the flint must have been brought from a distance for the especial purpose of fabrication into rude implements by the people who used them; and are therefore not accidental either as to their *form* or *occurrence*, but truly the work of man's hands in *primæval times*, and as such, like the *coin* or *medal* to the numismatologist, serve to illustrate faithfully the gradual progress of art, however rude, at a period antecedent to the introduction of metals by conquerors or more civilized nations with whom the aborigines became subsequently amalgamated.

The proofs, however, that such objects are really the genuine productions of pre-historic men are not generally received by the world at large, and can only be arrived at

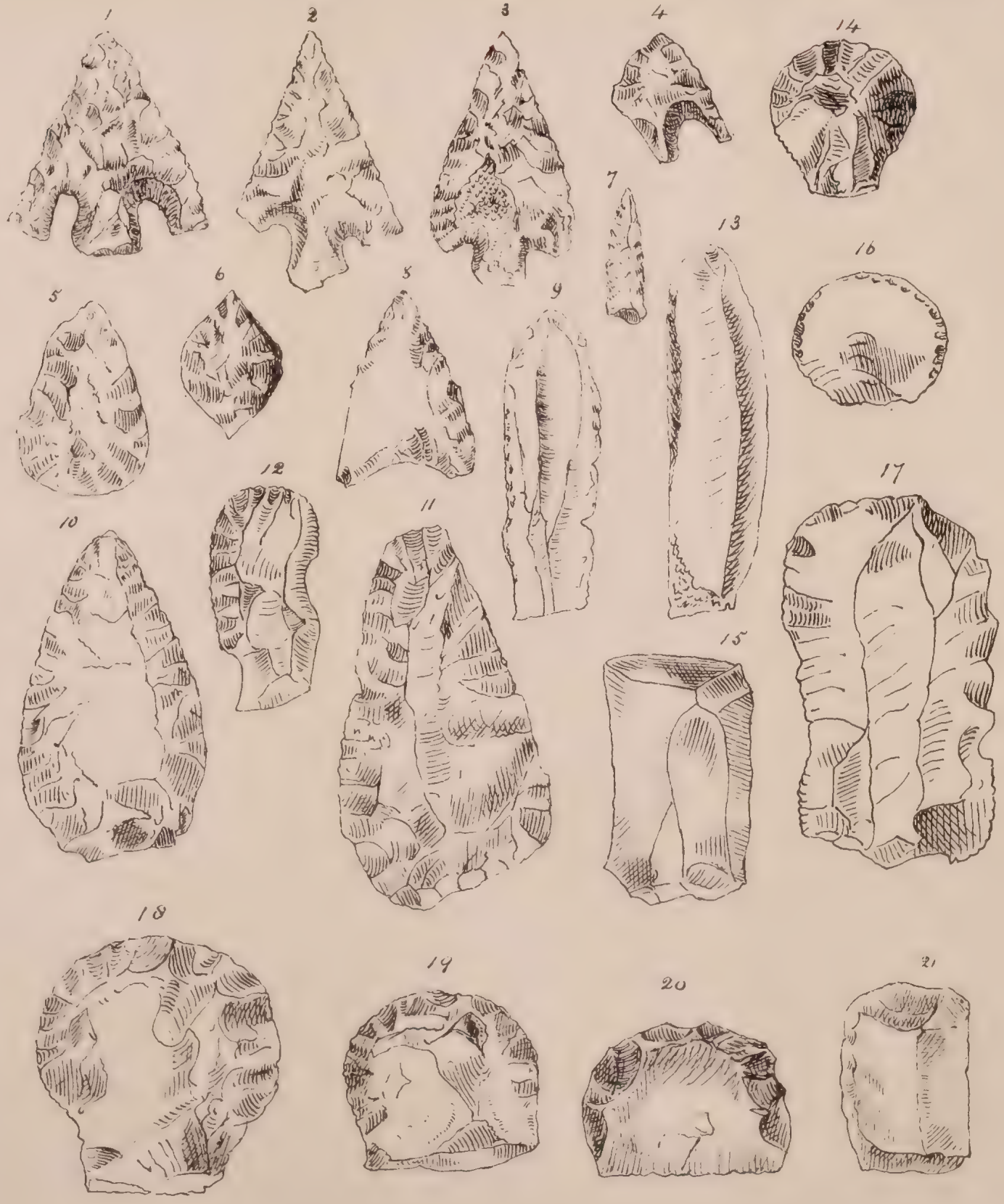
satisfactorily by a process of reasoning which is easy to carry out, and perfectly legitimate in its deductions. For instance, a *single* fractured flint, with perhaps little or no *definite* form, may present to the eye of those unaccustomed to examine such relics, no traces of an ethnological or historic character. But when we find *several* fragments of a similar appearance, and of a concavo-convex shape, flakes evidently struck off from the sides or angles of a mass of flint, the fact instantly and very naturally suggests itself that they are not the results of *accidental* fracture or the effects of frost, but rather that of a succession of blows, as a slight convex or conchoidal prominence, which denotes the point or bulb of concussion where the blow was applied, is almost invariably observable at the end of the flake; and when, in addition to this, we find also other fragments in further progress of formation into some form of implement; and others, again, *complete* and rather *artistic* in *finish*, as arrow-heads, with barbs and tangs, the sides minutely chipped, and the two surfaces ingeniously constructed one much more convex than the other: under such circumstances, we cannot arrive at any other reasonable conclusion but that we have before us the veritable manufactures of a primitive people; as it requires no arguments to prove that the crude flints, the flakes, and finished weapons are all historically connected with each other, and form individual links in the same chain of reasoning. Hence flint or stone implements and fragments which can be shewn to conform to the premises already laid down, both *geologically* and *structurally*, are undoubtedly genuine.

There is one very remarkable fact connected with stone and flint implements, that the *same form* appears to have originated in the minds of various races of people widely separated by *time* and *space*, as the primæval Celtic inhabitants of Britain, Sweden, Denmark, and France, the lake dwellers of

Switzerland, the early races of India, the Red Indians of America, the primitive Greenlanders, the modern Esquimaux, and the natives of the South Sea islands, with some of whom we cannot trace any probable intercommunication in ancient or modern times, and we can only conjecture that a similarity of wants have suggested a similarity of endeavours to provide for their attainment, whether in implements for domestic purposes, the chase, or war; which conclusion, however, is not quite satisfactory, and it remains still for the ethnologist and anthropologist to adduce some additional and more probable evidence which will explain this singular coincidence.

Now, although flint and stone arrow-heads, adzes, knives, scrapers, saws, sling-stones, &c., have long been found in considerable numbers in the neighbourhood of Bridlington, Malton, and along the Wolds, no instances have occurred in the West Riding or this district, that I am aware of, except at distant intervals an occasional adze or hammer-head has been picked up on the moors; some of which, I believe, are now in the Museums of the Halifax and Bradford Philosophical Societies, and in the possession of the Rev. W. C. Lukis, of Wath rectory, near Ripon.

In the ancient village of Adel, however, during the past autumn of 1868 and the spring of 1869, while excavating a small plot of ground about fifty yards square at the back of the Reformatory, numerous fragments of flint have been found, as also various implements of the same material, which consist of three beautifully-finished arrow-heads, with tangs of different shapes; a broken arrow-head of shorter proportions; several oblong, conical, or leaf-shaped arrow points, without tangs; javelin-heads; knives; numerous flint flakes; one very small three-sided implement or point, evidently intended to fix at the end of an arrow, carefully chipped up each side; another small, flat, lozenge-shaped implement, elaborately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chipped into form, as if intended for insertion also into the end of an arrow, and probably constructed to allow of its being reversed if one point was broken; a few slightly hemispherical masses of flint, rudely chipped into shape, and probably intended as sling stones; several semi-circular implements, also carefully chipped into form, which Mr. Evans considers as having been scrapers, from the circumstance that amongst the Esquimaux of the present day implements of precisely similar character are still used for scraping the skins of animals. Whatever other use these may have had, they appear to have been in general request, as we find them in different parts of Britain worked into one uniform pattern. There are also several flints of different sizes, of a rather singular shape, and so strongly resembling *gun* flints that I was at first doubtful as to their authenticity.* In an able and interesting lecture, however, delivered by my friend Mr. Evans at the opening of the Blackburn Museum, "On Man, and his earliest known Works," he states that Egyptian arrows have been found tipped with small arrow-heads of flint, in form much *resembling gun flints;* again, that in the account of the army of Xerxes, Herodotus mentions the Ethiopians as having long bows and short arrows, with sharp stones instead of iron for points; and also that flint arrow-heads have been found in Greece, on the field of Marathon (whose date would be B.C. 490), and may, therefore, have been of a similar form, which is well adapted for inserting between the split end of an arrow, and then held in position by a tight band.

The flints now under consideration have all been picked up by the boys at the Reformatory while employed in digging the ground, and who would have thrown them away but for the accidental circumstance that one of them having been seen by Mr. Twigg, the indefatigable super-

* See Plate.

intendent, who immediately recognized the great *similarity* it bore to some of the beautiful examples of flint implements in the Art Treasures Exhibition, then open in Leeds. He therefore stimulated the boys by a trifling reward to a more careful search, and the specimens since found he has presented to the Museum of the Leeds Philosophical and Literary Society, with the exception of one very beautiful arrow-head, of broader shape, which is now in the possession of Mrs. Eddison, of Adel.

In the year 1867, a flint flake, with bevelled edges, was also picked up in the same locality by the Rev. R. J. Mapleton, who instantly perceived the interest of so trifling an object in an archæological point of view, and gave me the specimen. From the limited space in which they have all occurred, it would appear to have been the site of a manufactory of these rude implements to meet some anticipated emergency, the material for which has evidently been brought from a distance, as we know that geologically flints cannot have occurred at Adel or anywhere in the neighbourhood of Leeds, situated as it is on the coal-formation, with its accompanying sandstones and grits. The nearest point, therefore, at which they could have been obtained is the chalk districts on the N.E. coast, as Scarborough, Bridlington, &c.*

It is very probable that many other specimens may have been turned up during the enclosure of the moorland at different periods, for as early as 1715, Thoresby figured in his *Museum Thoresbyanum* two *flint arrow-heads*, which were found near *Adel mill*. One has a tang and barbs, the other acutely ovate, precisely like some found at Bridlington, by Mr. Tindall, and therefore probably the productions of a

* What adds to the probability of their manufacture on the spot is that not only considerable numbers of flint chippings occur, but also the *flint cores* from which they had been struck.

branch or colony of the same race, and who may have brought with them such materials as their experience taught them would be essential in the course of their inland migrations.

Now, the question arises, How can we account for the occurrence of flint implements at all, in this particular locality, as we have no record of a settlement of the early Britons at Adel? In the first place, it must be borne in mind that comparatively little of the history or movements of those primitive people has come down to us. In many instances all we know of their having had any particular settlement is derived from the accidental discovery of their coins or burial mounds, from which we naturally infer at least temporary occupation. It is, therefore, pardonable to endeavour to fill up such blanks as occur in the annals of this early people from the scanty memorials or traditions we have.

It is recorded that at Winmoor, in the parish of Seacroft, a great battle was fought between Penda, king of the Mercians, and Oswiu, king of Northumbria, in 655; and the Annals of Nennius contain a notice of the final engagement between these rival forces on the field of Gaii or Giti, in 656. The place where Penda's army was encamped is called *Manau* or *Manu*. The exact position of these places, however, is uncertain, as it is difficult to reconcile the early names with those at present known. The Rev. Daniel H. Haigh, in an interesting paper read before this Society in January, 1857, in alluding to the Annals of Nennius, ventures an ingenious suggestion as to the correct reading of these localities. That as *Gu* and *G* are constantly written for *W* in the early transcripts, and hence *Giti* will be *Witi*, to which if *wood* is added most probably means Witiwood, or *Weetwood;** and the same with *Manu* for Meanwood,

* In Thoresby's *Ducatis* we find that Dr. Hick gives *Woctur* as the Saxon for Weetwood.

where Penda was encamped. If such was the position of the Mercian forces, who probably moved by *Shadwell*, *Thorner*, and *Blackmoor* to Meanwood, it thus affords some clue to the occurrence of the flint implements at Adel, which may have belonged to the Britons under Oswiu, who, if they took up position on the low moorland at Adel to intercept Penda's army, would be only separated by a small stream (Adel-beck) from the enemy on the high ground at Meanwood; and, therefore, Adel may have been the stronghold of the British forces in defence of the royal city of *Oswiu* at Leeds, against which the Mercian attack was principally directed. Be this as it may, however, as we know the Brigantees had positions at *Rombald's moor*, *Baildon moor*, *Lightcliffe*, *Bramham moor*, *Osmondthorpe*, and also along the Wolds up to the East coast, it is not improbable that in passing through the country they may have occupied Adel, though there is no indication that any lengthened stand was made here, as the site does not appear of even sufficient importance to have handed down its name to the present day, unless the place, in the parish of Adel, called *Burhedurum* in *Domesday Survey*, indicates this spot.

I am aware that in the opinion of some archæologists the decisive battle of Winwædfield, as it is called, was fought at Whitwood or Winmoor, and the ford crossed by the retreating army of Penda was the Aire at Woodlesford.* But from

* As some confusion has arisen between St. Oswald, and Oswy, or Oswiu, and the statue of the former over the porch of Methley Church having been considered as evidence that the battle of Winwæd was fought in that neighbourhood (as St. Oswald is reported to have made a vow to build a church if he obtained a victory over Cadwalla), I wrote, therefore, to my friend, the Rev. D. H. Haigh, for his opinion on the question, and received the following reply:—"I once thought that Woodlesford might be the scene of the battle, but I was influenced by a wrong etymology. Woodlesford is certainly the 'ford of *Wothel* or *Wodel*,' a name of which we have other occurrences simply, as on a coin of one of the kings of Mercia, and in composition, as in the name of Wothelgeat, the ancestor of the

Winmoor and Seacroft, where, according to tradition, previous engagements of the Britons and Mercians had taken place, it is quite as likely for the forces to have moved by the barren moorland across the country to Meanwood and Weetwood, en route to the British villages at Ilkley and other districts to the north and north-east, or to attack Leeds from that direction. Presuming this to have been the course taken by the rival armies, and that having met at Meanwood great slaughter ensued, and the kings of the Mercians and East Angles, together with thirty of the principal commanders, are recorded to have been defeated and left dead on the field, upon which the routed Mercians fled, and, in seeking the nearest ford, which proved so disastrous to them, they would pass by Horsforth or Headingley to Kirkstall, and there attempt to cross the *Winet*, *Wynnet*, or *Vinwed*, the name by which the river Aire was anciently known.

Gale, in a letter to Thoresby, says: "Search if the name of that river Aire may not have been several times changed betwixt its head and mouth at Kirkstall. I think it was called *Winet*." *Vide* Bede, anno 665, "In regione Leedis, juxta flumen Winwed."*

Bede says the battle was fought near the river Vinwed, which then, with the great rains, had not only filled its

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Mercian kings. I am satisfied now that the battle on the river Winwæd, in which Penda was defeated, was at Kirkstall. St. Oswald's victory over Cadwalla was twenty years earlier than this, and its scene is clearly marked by Ven. Bede. In his time it was named *Hefenfelth*, and a stream ran by it called *Denisesburn*; it was close to the wall, north of it, and it was near to Hexham; circumstances which leave no doubt as to its identity with St. Oswald's Chapel, three miles from Hexham, and a stone's throw north of the wall. It is wrong to say that St. Oswald vowed to build a church on the spot. He simply raised a cross before the battle, and this cross remained long afterwards. Eventually a church was built where the cross had stood; but the time of the erection of this church was not long before A.D. 731, when Ven. Bede wrote his history. Methley has no more to do with the personal history of St. Oswald than any other parish where a church was consecrated to his memory."

* Thoresby's *Correspondence*, vol. i., p. 233.

channel but overflowed its banks, so that more were drowned in the flight, than destroyed by the sword.*

Archdeacon Nicholson, in a letter on the same subject to Thoresby, December 8th, 1694, says: "But what I pray you is the meaning of these words of Bede (Book iii, chap. 24), 'near the stream Vinved,' which the Anglo-Saxon translator has rendered 'near Winwed stream'? and what is the meaning of the proverb mentioned by Flavilegus—'In Winwed river was avenged the death of Annæ, &c.'? P. Cressy boldly asserts, in Roman manner, that there is to be found near Leeds a village *Winfield*, but this is a fable of his own. There is certainly a place—Winmore—four miles from that town, on the road leading to York; and the scholars and antiquaries imagine this to be the place of the battle. In my opinion, the 'Winwed fluvius,' in Bede's Latin, seems to be what is now called the Aire, which flows by the town of Leedes. Meanwhile, let the inhabitants of the locality ascertain if there be any stream or brook with a name like that."†

Speed, in 1676, says, "Near unto Kirkstal, Oswie, king of Northumberland, put Penda, the Mercian, to flight; the place wherein the battel was joyned the writers call Winwid Field, giving it the name by the victory. From which it would appear there was no particular place called Winwid-field, but that the spot was henceforth called the Field of Victory," or the field connected with the flight across the Winwid, to commemorate the conflict; which may have extended by both Meanwood and Weetwood to Kirkstall, at that period, doubtless, a continuous tract of moorland and wood. Speed is also recorded to indicate on his map the

* "Et quia prope fluvium Vinwed, pugnatum est qui tunc præ inundantia pluviarum late alveum suum, imo omnes ripas suas, transierat, contigit ut multo plures aqua fugientes, quam bellantes perderet ensis."—Bede, *Hist. Eccle.*, by Giles, Book iii, c. xxiv, p. 354.

† Thoresby's *Correspondence*, vol. i.,p. 185.

battlefield near Kirkstall Abbey; and the Rev. Mr. Haigh shews that it appears, from a charter in the Monasticon, there was at the west end of the bridge at Kirkstall, and nearest to Weetwood, a piece of land called Winnet, corresponding to Wynnet and Wynnod of two Welsh versions, and to the Winwed of Bede.

So that it appears to me, as far as ancient records and traditions are to be depended upon, we have ample evidence the battlefield of Gai, Giti, or Witi, was at Weetwood, and that the subsequent flight and loss of Penda's army was in the attempted passage of the Aire at Kirkstall.

It has been asserted, however, that stone implements were used in this country so late as the battle of Hastings (A.D. 1066), and, therefore, we need not go so far back into the past to account for their occurrence or their fabricators; but as Mr. Evans very justly remarks: "Whoever reads William of Poitiers' account of that battle, will find that his words are: 'Jactant lignis imposite saxa,' which seems to imply rather that certain stones were thrown from the end of wooden instruments, than that the stones were used either as spears, arrows, or lances."

The mere fact of stone implements, of whatever kind, having been used at the battle of Hastings, does not invalidate other specimens having a far more remote antiquity, as, probably, that might have been nearly if not the very last occasion on which stone implements were used for defensive purposes in England; and, also, as the employment of such implements had been transmitted down through successive generations, their earliest use would be lost in the lapse of ages, or might be confined to particular localities, which appears to have been the case with some of the Indian tribes. In the *Proceedings of the American Philosophical Society** there is a very interesting communication from

* Vol. x., 1867, p. 352.

Mr. F. V. Hayden, of his discovery of fragments of pottery, flint flakes, arrow-heads, &c., in the refuse of an Indian village. He says, "On a recent visit to the Pawne reservation at Loup Fork, I discovered the remains of an old Pawne village, apparently of greater antiquity than the others, and the only one about which any stone implements have yet been found. On and around the site of every cabin in this village I found an abundance of broken arrow-heads and chipped flints, some of which must have been brought from a great distance, and a variety of small stones which had been used as hammers, chisels, &c. I gathered about half a bushel of the fragments of pottery, arrow-heads, and chipped flints. No Pawne Indian now living knows of the time when this village was inhabited. Thirty years ago an old chief told a missionary that his tribe dwelt there before his birth; but he knew nothing of the use of stone arrow-heads, though he said his people used them before the introduction of iron. This discovery is interesting, as it is the first tribe that I have ever been able to find connecting the stone age with the present in the Missouri Valley. I have asked the most intelligent Indians of more than twenty tribes in this valley, 'How far back in the past the Indians used stone arrow-points?' and I have received but one answer. They would point towards heaven and say, 'The Great Spirit only knows; we do not.'"

In conclusion, I would remark it is very probable there are several other localities in the neighbourhood that have been occupied by the early Britons, of which we have no record, as three instances bearing upon this point have come under my notice within the last two years. In 1867, a fine example of an early British uninscribed gold coin was found in a turnip field at Badsworth, near Pontefract, and is now in the possession of John Moore, Esq., of Moor House. On one side of this coin was a very rude disjointed representation

of a horse, and on the other an equally rude attempt at the Macedonian Phillippus. The type, however, is not exactly that of the usual British coins found in Yorkshire, but rather of those which Mr. Evans thinks may belong to the South Midland district (Plate A, fig. 13), or some tribe with whom the Brigantes might have come in contact; and this solitary example may not have been the only coin which has occurred, but the only one preserved, as such treasure-troves are too frequently sold to prevent a claim being made. During the same year, also, a massive gold armilla, whose value as old gold was £18, was found within a few miles of Leeds, and offered to me for sale; but, for the reason alluded to, the exact locality was withheld, unless I became the purchaser; and, lastly, in the autumn of 1868 an example of gold ring-money or rude ear-ring, weighing 336 grains, was found in a ploughed field at Cawood, which also passed into the hands of a goldsmith at Leeds. We must therefore conjecture, I presume, in each case, these sites to have been British stations, or at least local occupations, or that the first had been dropped by some soldier of the Roman legions in crossing by the fifth or eighth Iter, both of which passed near Pontefract, and who had acquired it by conquest from the Britons with whom he had come into contact in traversing the county.

Whether, however, the neighbourhood of Adel has been the site of the particular occurrences to which I have alluded or not, it is very evident from the limited space in which the flint implements and flakes have hitherto been found, they must have been manufactured on the spot by the Britons to meet some special necessity; and should the soil at Weetwood and Meanwood eventually be found to contain similar articles of this early period, it will afford additional evidence that the conjecture I have adduced for their occurrence is not beyond the bounds of probability.

PROCEEDINGS

OF THE

GEOLOGICAL AND POLYTECHNIC SOCIETY

Of the West-Riding of Yorkshire,

AT THE SEVENTY-FOURTH MEETING, HELD IN THE TOWN HALL, PONTEFRACT, ON THURSDAY, NOVEMBER 4TH, 1869.

The Right Hon. LORD HOUGHTON, D.C.L., F.R.S., and F.R.S., Lit., Vice-President of the Society, in the Chair.

LORD HOUGHTON, in opening the proceedings, said: This is the seventy-fourth meeting of the Geological and Polytechnic Society of the West-Riding of Yorkshire. The Society was founded originally at a meeting of the great coalowners of this important district, covering as it does an area of something like 500 square miles, for the object, at first, of inquiring into the science of mineralogy, and bringing to bear on that great department of British industry all the resources of science; but as the meetings went on it was suggested that they should be extended to other subjects of a cognate character, embracing archæology and history, though the Society remains in its foundation, mainly, geological, and it is to geological objects one would wish it to be chiefly applied. You know, and it is not for me to tell you, how interesting a field of geology is presented to us in this great county to which we have the honour to belong; and receiving, as we do, such a large amount of material profit from its mineral products, and perceiving, as we do, day by day, that all the beauty of nature is passing away under the dominion of smoke, we nevertheless feel that we must make

the best of it; and if we cannot keep our flowers and sheep clean, at any rate the next best thing we can do is to get as much coal as we can, of the best and cheapest kind possible. There are other mineral interests besides that of coal, connected with this county, the development of which requires considerable study and information; and I should be very glad if either now, or at any future meeting of this Society, attention should be drawn to these other elements of wealth. I came just the other day from the North-Riding of Yorkshire, where I saw the wonderful development of ironstone which has taken place in the neighbourhood of Middlesborough. There, by the chance discovery of a gentleman who was out shooting some twenty-five years ago, in taking up a piece of stone which from its appearance he believed to contain iron, which somehow or other could be got out of it; by the development of the same idea which had taken place in many minds, and the application of the industry and acuteness of an engineering population, there had risen up, almost as quickly as Chicago, or any of the other wonderful cities of America, the town of Middlesborough, in the North-Riding of Yorkshire. But, for the amusement of the Society, I cannot say that I regret that we shall not be kept in the domains of science, but be enabled to consider archæology and history. We have a paper from Mr. Surtees, that most enterprising and ingenious antiquary, in which he undertakes to show us the real meaning and history of the name of the town in which we are now met. I don't know how he is going to do it. But he is a clever man, in fact the only fault about him is that some people think him rather too clever. It is not for me to find fault with Mr. Surtees, but there may be a little bit of poetry about his antiquarianism; and he is supposed, not only here, but on the other side of the water, as they say in America, to combine a certain amount of fancy with his historical researches. It is not for me to say

whether this is so or not, particularly so before we hear the Paper, nor indeed afterwards should I undertake with my limited knowledge to do so, because we all know that some discoveries that have seemed extravagant, and almost impossible, when first suggested, have been found, when more closely investigated, to be well supported. We are also to have what, no doubt, will be a most interesting Paper on the "Pre-historic Monuments of Brittany," by the Rev. W. C. Lukis, rector of Wath, near Ripon. This suggests to me how much we regret here the absence of the President of this Society, Earl de Grey and Ripon, he being occupied in continued Cabinet Councils, in which he is determining how this country is to be governed (or misgoverned, I will not say which, because we here meet with different political opinions), but we nevertheless know that he has applied his serious mind to grave subjects with the best possible intentions, and I hope with the best possible results. The last Paper, I am sorry to say, is not to be read; but instead of it, Mr. John Ffooks has sent a request to be made a member of this Society. Mr. Walter Rowley, mining engineer, of Leeds; Mr. Banks, solicitor, and Mr. J. D. Greaves, mining engineer, Wakefield; also wish to be elected members, to which I have no doubt you will assent. It will afford me great gratification to receive the names of other members. The subscription is of a peculiar character, being 13*s.* per annum. I have suggested to Mr. Denny that it should be made £1, which would look more respectable—(laughter)—and I have no doubt he would get more money.—The following gentlemen's names were then added:—The Right Honble. J. Parker, of Darrington Hall, Pontefract; J. H. Barton, Esq., of Stapleton Park, Pontefract; Edmund Lord, Esq., East Hardwick, Pontefract.

The Chairman concluded by calling on Mr. T. W. Tew, of Carleton, near Pontefract, to read his Paper

ON THE ROCKS OF THE NEIGHBOURHOOD OF PONTEFRACT; WITH SOME OBSERVATIONS ON THE DISCOVERY OF SOME BONES OF THE BOS PRIMIGENIUS (LONG-FRONTED OR SHORT-HORNED OX).

In presuming to submit a Paper to this meeting of the Geological and Polytechnic Society of the West-Riding of Yorkshire, I do so with feelings of considerable diffidence, having so recently been admitted a member of your Society, and being but a mere amateur in the study of Geology.

But before proceeding further, I must express the gratification felt by my fellow-townsmen at the selection of Pontefract for a third, if not a fourth, visit from the Geological Society of the West-Riding, and the great pleasure derived from seeing the noble lord occupying the chair; and I beg to offer on their behalf a cordial welcome both to him and to the members of the Society.

I have, in preparing this Paper, done my best by the collection of facts to accomplish the task intrusted to me by Mr. Henry Denny, A.L.S., the General Secretary, that of making "Some Observations on the Rocks of this Neighbourhood, and the Discovery of some of the Bones of the *Bos Longifrons*, the long-fronted or small Fossil Ox." Lord Houghton has stated, to quote one of his poetical effusions, that

> "To our instructed, patient, seeking eyes,
> Each day reveals the outer world more clear."

And this result has doubtless been greatly advanced by following the noble lord's advice to those who meet again after travel:—

> "Then talk with fair exchange, share all your gains."

I therefore proceed with the more confidence to offer my gleanings from the field of science, since it is in the collection of facts by humble contributors that the necessary materials are found to unravel geological problems, and to test the truth of the different theories which are advanced to explain the mysteries of nature.

Pontefract, selected as the place of meeting this afternoon, is destined to become of considerable importance as a coal town, not only to the mere capitalist who digs down into the bowels of the earth in search of mineral treasures, for the sole purpose of converting them into wealth, but to the mining engineer and to the student of natural science, of which Geology forms a branch.

The town seems almost to have been destined, from the elevated position nature has given it on the top of a silicious sandstone rock, as a central point of observation, from which not only can the rocks of the surrounding country be surveyed, but local objects of archæological and historical interest be best examined.

If you will now follow me on these maps, directing your eyes from the sun setting to the sun rising, the country around you presents these geological features: — On the West, commencing with the Millstone Grit at Halifax, by Wakefield, Sharlston, Snydale, Purston Jaglin, and terminating near Pontefract Cemetery, range the carboniferous rocks, or more ancient geological records of the country. Under our feet, at Baghill, Glass Houghton, Marlpit Hill, Mill Hill, Wentbridge Hill, and Hawthorn Cottage, are the lower Permian Red Sandstones of Smith and Sedgwick. A little towards the East, at Kirk Smeaton, Brockendale, and Darrington, are the Lower Magnesian; at Womersley, Brotherton, and Garforth, the rocks of the Upper Magnesian Limestone, or middle period of the geology of the district; whilst the country about Fenwick, Birkin, and Chapel

Haddlesey, are the sand, alluvium, and gravel beds of a tertiary formation.

Since the year 1840, when the Rev. William Thorpe, of Womersley, read at Doncaster, on the 2nd December, on the occasion of the twelfth quarterly meeting of this Society, his valuable and able Paper on "The Agriculture of the West-Riding of Yorkshire, considered Geologically," twenty-nine years ago, perhaps in no previous period of equal duration has so great a progress been made, in this division of Upper Osgoldcross, in improved methods of cultivating the land, by the application of artificial manures and mechanical contrivances, and in the pursuit of the study of Geology. The railways of this Riding, and more particularly the two branches of the Lancashire and Yorkshire railway—the lines to Goole and Methley, which pass by this town—have chiefly been constructed and opened since Mr. Thorpe read his Paper; whilst intimately connected with this railway system the coal fields on the west of us promise, through such enterprising mining proprietors as the Messrs. Pope and Pearson; Rhodes and Dalby; Ellis and Broadbent; Shaw and Son; and Mr. W. H. Wilks; in a few more years to change the character of Pontefract from a quiet agricultural market town to become the centre, and the heart and lungs of an important mining district.

For the future increasing prosperity of this town and neighbourhood, we must look upon our coal fields as the great material source of power and wealth. In this country coal is the great source of power and wealth. The wood of England was burnt up long ago, and now there is not timber sufficient for the carpenter and the joiner, let alone for household use. In fact almost everything we do is done more or less by the use of coal: a fact which cannot surprise us if we look to what coal is, in its chemical and physical nature. It is a kind of spring and store of forces which can be let go

whenever we please. Sir W. Thompson, the great electrician, has suggested that "where there was a kind of force which could be wound up and let go at any moment, and whenever we liked, and be turned into energy, as in the case of a clock, it should be called 'Potential Energy.'" Now, of all forms of potential energy, the most wonderful is coal. If we take one cwt. of coal, and let off all its force suddenly, as when we would let off a watch spring, and use this force in raising the coal up, it would shoot up more than 2,000 miles high, even if the force of gravity acted the whole distance; or it would raise 112,000,000 lbs. of coal one foot high.

This force is turned into use by means of heat, and this is the power used in reducing metals, and for almost every chemical change that takes place; while we have the inventions and improvements of Watt and Stephens on the steam engine, stationary and locomotive, to turn it into mechanical motion.

Every improvement of Mr. Fairlie in the steam engine must increase the power of coal; every invention for consuming smoke and preventing the waste of heat, is a step in this direction; and every cook who husbands the use of coal in her kitchen fire, contributes indirectly to the support and prolongation of the greatness of the British empire. For if water-power and wind-mills cannot compete with coal now, what are the chances that they will ever again be able to do so, when science is every day making coal more powerful? We must in truth now regard water-wheels and wind-mills as mechanical inventions of a bygone age.

The consumption of coal within less than sixty years has probably increased sevenfold, while the increase of wealth and population has been proportionate. If this consumption of coal continues to increase at such a rate, the production of coal must keep pace with it. In a few years' time perhaps even horse-ploughing, and reaping with scythes and

sickles, and threshing with flails, will be looked upon like water-wheels and wind-mills as obsolete contrivances; and on farms, the introduction of the Wakefield Ploughing Company's steam ploughs and reaping and threshing machines, will be universal; while in the pumping of sewage, and in a hundred other different ways, steam and coal must come into general use. Nothing but a rise in price will ever check this demand for coal.

But coal is also the great agent in giving value to mineral products. The extreme importance of coal in this respect to this country is partly shown by the circumstance, that the value of the metals produced from the mines of the United Kingdom, in 1868, is estimated at £15,736,416 sterling. Iron ore was raised to the extent of 10,169,231 tons. From this ore was obtained 4,970,206 tons of pig iron. And for minerals not smelted, including salt and barytes, &c., a further value may be added of £2,003,819 of money.

America has the largest coal field in the world, comprising an area of 310,500 square miles, whilst that of Great Britain is only 6,300 square miles; so that the moment this country ceases to command more abundant and cheaper coal and iron than her neighbours, the United States and other countries must increase in power and wealth, and we must be passed in the race of competition.

We ought, therefore, to be anxious to ascertain the extent of our mineral treasures, and to use our present means of potential energy and wealth to the best advantage.

It is to the probable extent and value of the coal fields surrounding us, that I wish now to direct your attention.

This large map will, I hope, give you some idea of the potential energy and wealth surrounding this town on the west. It illustrates a portion of the West Riding coal field—a fragment only of one continuous series of the Great Northern coal field,—Lancashire, Newcastle and Colebrook Dale.

In ascertaining the quantity of coal yet unworked, Mr. Rowland Childe, Mining Engineer, of Wakefield, has favoured me with the following calculation. He has taken out of the twenty-two beds of coal, found in boring through the coal measures to the Millstone Grit, on the top of which they rest, the most important beds, sixteen in number, to a depth of 600 yards. But with respect to the six thinner seams, he has confined the depth to a distance from 200 to 400 yards from the surface, according to the quality and thickness of the coal.

For the purpose of this calculation, he has assumed this coal field to extend from the outcrop of the Halifax beds—the lowest series of beds in the coal measures—on the North, to the river Don, near Rotherham, on the South; and from near the outcrop of the Magnesian Limestone on the East, to the outcrop of the Halifax beds on the West, comprising an area of 550 square miles. Dividing this area into two divisions, he estimates the unworked coal on the North side of the Lancashire and Yorkshire Railway to be 1,817,310,620 tons, as on the sixteen following beds:—

Name of Bed of Coal.	Thickness. ft.	ins.	Quality of Coal.
Shale Coal	2	0	First Class House Coal.
Stanley Main or Beamshaw	6	0	House and Smelting Coal.
Barnsley Bed or Gawthorpe	3	6	House and Engine Coal.
Swallow Wood or Haigh Moor	4	6	Excellent House Coal.
Joan or Mitchell Coal	2	8	House and Steam Coal.
Flockton Thick, or 40 yards Coal	2	0	House and Engine Coal.
Park Gate or Brown Metal	4	0	Ditto ditto.
Little or Green Lane Coal	2	6	Steam and Smelting Coal.
Middleton Main	4	3	House, Gas and Engine Coal.
Wheatley Bed	3	0	Engine and Lime Coal.
Blocking Coal	1	10	House Coal.
Beeston, or Shirtcliffe	3	10	House and Engine Coal.
Low Moor Black Bed	1	10	Ditto ditto.
Low Moor Better Bed	2	4	Best Smelting Coal.
Halifax Hard Coal	2	3	House and Engine Coal.
Halifax Soft Coal	1	6	Ditto ditto.

And the unworked coal south of the Lancashire and

Yorkshire Railway to the River Don, he also estimates at 2,940,382,800 tons, in the seventeen following workable beds, making a grand total of 4,757,693,420 tons, or for the sake of popular illustration, equivalent to a bed of coal of nearly twelve feet in thickness, over the whole area of this coal field of 550 square miles.

NAMES OF BEDS OF COAL SOUTH OF THE LANCASHIRE AND YORKSHIRE RAILWAY, TO THE RIVER DON.

ABOVE THE ACKWORTH ROCK.

The Nostel Coal.
The Crofton Top Coal.
The Crofton Low Coal.
The Woodmoor, or Weithwood, or Melton Field Coal.

The Winterbed, Shale, or Abdy Coal.
The Stanley Main, Beamshaw, or Kent Thin Coal.
The Mapplewell, or Kent Thick Coal,
The Barnsley Bed, or Warren House Coal.
The Haigh Moor, or Swallow Wood Coal.
The Flockton Thick, or Forty Yards Coal.
The Brown Metal, or Park Gate.
The Silkstone Coal.
The Whin Moor Bed.

AND PART OF THE DISTRICT.

The Low Moor Black Bed.
The Low Moor Better Bed.
The Halifax Hard Coal.
The Halifax Soft Coal.

But there is also a large and extensive coal field on the S. E. and S. of Wakefield, and E. and N. E. of Barnsley, which is practically only just now being approached. This coal field comprises an area of eighty square miles, and it contains very valuable seams of coal.

Taking, therefore, the total quantity of coal raised in Yorkshire from 441 collieries at 9,740,510 tons per annum, the coal field of this part of the county of 550 miles area will require, according to last year's consumption, nearly 489 years to exhaust it, or it would supply the whole demands of the United Kingdom (from 2,992 collieries actually at work in 1868, which Mr. Robert Hunt, the Keeper of Mining Records, states was 103,141,157 tons,) for about forty-seven years.

Mr. Rowland Childe's large diagram represents a true section of this West-Riding coal field, which is twenty-two miles in length. It is drawn to a longitudinal scale of six inches to one mile, and vertically sixty feet to one inch. It is taken from the Kirkburton colliery on the S. S. W., by the Emly Moor, Flockton, Denby Grange, Ossett, Round Wood, Methley, Kippax, and Garforth collieries, to near Micklefield on the N. N. E.

The thick black lines in the section are the coal beds in the carboniferous rocks, and the vertical ones the faults, throws or dislocations, breaking through the coal measures, forming walls between them, and dividing them into chambers.

From Kirkburton to near Wakefield is the first great chamber or field of coal, the seams in which dip down eastwards considerably below the surface of the ground. From Wakefield to Methley the beds of coal lie nearly level. From Methley to Kippax they are concave or slightly dish-shaped. From Kippax to Garforth the beds of coal rise very rapidly again to the ground, until near Micklefield they crop out nearly at right angles, or unconformably against the Magnesian Limestone.

At the Kirkburton colliery the Halifax soft coal, the lowest bed in the series of coal measures resting on the Millstone Grit, could be reached by the shaft of that pit at a depth from the surface of the ground of about 303 yards. At the Victoria colliery, near Wakefield, that bottom bed would require a shaft to reach it of 767 yards, whilst under the Pontefract Park it will probably be necessary to sink 1,016 yards to exhume the coal, and at the Denaby Main colliery 1,204 yards; until at a little distance N. N. E. of Micklefield, the Low Moor and Halifax beds crop out altogether against the Magnesian Limestone, and beyond that point, and in that direction, no coal would be found.

This other section of this coal field on the South side of the Lancashire and Yorkshire Railway is taken in the line of the longitudinal fracture of the coal deposit dipping under the Magnesian Limestone. This section is twenty-seven miles in length. It commences at Halifax with Beacon Hill, due W. and E. to Chevet Hall, then by Ackworth Moor top to Baghill and Brotherton. In the line of this section the Lower Permian Red Sandstone and Magnesian Limestone formations slope against the coal beds of the carboniferous rocks, occupying a position geologically more conformable than in Mr. Childe's section; that is, side by side with each other.

I have now come to the chief point to which I would draw your attention—the probable existence of coal under the Magnesian Limestone formation; Mr. Woodhouse, no mean authority, observing of this part of the coal field on the E. and S. of this line of longitudinal fracture, that it was within the last few years supposed that it terminated wherever it was overlapped by the Magnesian Limestone or New Red Sandstone formations, and that it was chimerical to expect to find coal near Worksop or Conisbro'. But near Worksop the Barnsley or Warren House bed of coal, the third marketable seam in our West-Riding series, is now being worked at a depth of 610 yards below the surface of the ground, and 450 yards below the lowest bed of limestone.

At the Denaby Main colliery, the deepest pit in Yorkshire, as well as the most easternly, southwards, the Barnsley bed of coal is worked at a depth of 449½ yards from the surface. The dip of the strata is to the E. or perhaps N.E., and thickness of bed 7 ft. 8 in, to 8 ft. 9 in. If at this colliery, seventeen miles S. S. E. from Brotherton, coal can be profitably worked at a distance of half-a-mile from the Lower Magnesian Limestone, and only one and a half miles from Conisbro' Castle, may not coal eventually be found under the

Magnesian Limestone formation at Owston, Carcroft or Knottingley, or even still further eastward at Reedness, or a little to the southwards of the neighbourhood of Selby? At Dukinfield, in Cheshire, the shaft to the bottom of the "Black Mine Bed" of coal is 690½ yards from the ground, and this is the greatest depth at which coal is at present worked.

Mr. Bingham, at Ince, near Wigan, has just proved a seam of coal known as the Arley, at the depth of 810 yards. When the dib-hole at the bottom is sunk, this shaft of the deepest colliery in Lancashire will be 820 yards from the surface. At Owston and Carcroft, trial holes have already pierced through the Magnesian Limestone to a depth of 90 yards, and at Reedness, near Goole, another bore hole has been driven through the sandstone to a depth of 314 yards. If these trial holes should be continued, and coal struck, they will prove the truth of the theory of Mr. Woodhouse.

Between Woodlesford and the town of Pontefract the map is crossed by four diagonal lines. These lines mark the directions of the faults, throws, or dislocations breaking this coal field between Woodlesford and Pontefract on the N. E. side of the Lancashire and Yorkshire Railway, into five separate divisions. From Methley Hall to near Allerton Colliery the throw up to the North is 70 yards; from near Altofts to the Leadstone pinfold the throw up to North is again 70 yards; and from the Bay Horse Inn, Warmfield, to Newton Colliery, the throw down to south is 90 yards; the throw by Pontefract Park being not yet proved.

At the Stanley Hall Estate the Stanley Main bed of coal is reached at a depth of 120 yards, and at Heath Common, 156 yards below the surface of the ground.

In the Methley division, at the Fox Holes Collieries, the Stanley Main is reached at 130 yards, and at Allerton By-water at 127 yards.

In the Whitwood division the Stanley Main is reached at Whitwood Collieries at 70 yards; West-Riding Collieries at 79 yards; Sharlston Collieries at 334 yards; Bateson's Collieries at 84 yards, while at the Castleford Bore Hole the same bed is reached at a depth of 96 yards.

Similarly in the Merefield division, at Snydale, on the estate of Mr. Torre, at 175 yards; at Flass Hole at 127 yards; Victoria Colliery of Messrs. Rhodes and Dalby, at 225 yards; at Mere Field (Glass Houghton), at 170 yards; and at Wheldale Colliery at 115 yards.

And in the Pontefract division, at the colliery of Messrs. Shaw and Son, the Stanley Main is reached at 250 yards; while Messrs. Rhodes and Dalby hope to strike this seam of coal at Abbot's Close, near Pontefract Park, at 184 yards.

It is open to discussion as to whether these Stanley Main beds lie very conformable in these divisions of the coal field, as the depth at which they are reached varies so greatly, and at such comparatively short distances from the different collieries. But the depths to the Haigh Moor and deeper seams of coal suggest a more uniform degree of conformity to perhaps within a few yards, the beds thickening and improving in quality towards the S.E. On the Stanley Hall estate, the Haigh Moor coal is reached at 287 yards below the surface; at the West-Riding Colliery, at 232 yards; at the New Park, Alverthorpe, at 132 yards; at the Wheldale Colliery, at 285 yards; at Mere Field Colliery, at Glass Houghton, at 347 yards. This magnificent bed of coal is here for use, and fit for any domestic purpose whatever; the solid coal being four feet seven inches in thickness. This seam lies either level or, which is more probable, follows the dip of the Wheatworth bed above it, which is S.E. by S. The coal measures here yield fine specimens of *Stigmaria Fucoides* and *Calamites*.

I think that if a line was projected from Mere Field,

following the dip of the strata in a south easternly direction, it would be possible to estimate the depth the coal measures lie under the Magnesian Limestone formation at Owston and Carcroft. Now this dip below the horizon cannot exceed three degrees, and if the new shaft near Pontefract Park should strike this coal at about 361 yards it would still further prove the truth of the theory of Mr. Woodhouse and other mining engineers, that the Haigh Moor and lower beds of coal attain their maximum depths near this town, or probably extend further East on the S.E. side of the Lancashire and Yorkshire railway, dipping conformably under the Magnesian Limestone and New Red Sandstone.

There is one topic of absorbing interest to Pontefract, in the efforts lately made to obtain by Act of Parliament the coal under the Park. In the twentieth year of the reign of his Majesty King George the Third, an Act of Parliament was obtained for dividing and enclosing round Pontefract what from time immemorial had been an open pasture of about 1,300 acres of land. Over this pasture the burgesses of Pontefract and Tanshelf had the right of stray free of cost. This Act of Parliament narrowed the Park to its present dimensions of about 325 acres of land. On this enclosed portion the King's Majesty was dispossessed of all titles, rent charges, coals, and other minerals, in short of the freehold. But by a clause in the Act, the governing body, called the Park Trustees, were debarred from any power of getting coal or other minerals, or in any way breaking up the surface of the soil. The near approach of collieries to this Park suggested the desirability of repealing the mineral clause of the Act of 1780, and this year another Act of Parliament has been obtained which repeals the debarring clause of 1780—and by its 27th clause confers additional powers on the Park Trustees and Street Commissioners, and authorises those governing bodies to dispose of the coal. This coal has now been let,

and as preparations for sinking a shaft near the Park are being made, it may interest you to know the probable amount of "potential energy" lying under its surface. The Haigh Moor and the deeper beds of coal are estimated to contain 6,987,500 tons of coal; and if this estimate be an approximate value of the coal under the Park we must regard it as a vast magazine of power and wealth and of potential energy stored up in the bowels of the earth for the use and benefit of the inhabitants of Pontefract, and at a period of time immeasurably distant from our own.

ESTIMATE OF TONS OF COAL UNDER THE PONTEFRACT PARK.

Thickness of Bed.		Name of Bed.	Depth in yards.	Description of Coal.	Estimated produce in Tons per Acre.
Ft.	Ins.				Tons.
4	4	Haigh Moor	361	First Class House Coal	5,200
4	0	Depth from H. M. to Middleton Main	200	House, Gas and Engine Coal.....	4,800
2	0	Depth from M. M. to Beeston Coal.....	90	House and Engine Coal	2,400
2	4	Depth from B. C. to Low Moor Black Bed	85	House and Engine Coal	2,800
1	6	Depth from L. M. B. B. to Low Moor Better Bed.....	40	Best Smelting Coal	1,800
2	3	Depth from L. M. B. B. to Halifax Hard Coal	220	House and Engine Coal	2,700
1	6	Depth from H. H. C. to Halifax Soft Coal	20	House and Engine Coal	1,800
17	11		1,016	Tons per Acre...	21,500
		100 Tons per Inch per Acre.		Acres ...	325

21,500 Tons per Acre.
325 Acres.

6,987,500 Tons under Park. Tons... 6,987,500

I cannot but refer to George Stephenson, the railway engineer, whose philosophic mind, unaided by theoretical knowledge, rightly saw that coal was the embodiment of power originally derived from the sun. That small pencil of solar radiation which is arrested by our planet, and which

constitutes less than the 2,000th-million part of the total light sent forth from the sun, must be regarded as the power which enabled the plants of the carboniferous period to wrest the carbon they required from the oxygen with which it was combined, and eventually to deposit it in this neighbourhood, and under this Park, as the solid material coal. The Park Trustees hope the day is close at hand when the re-union of that carbon with oxygen shall restore the energy expended in the former process, and thus enable them to utilise the power originally derived from the luminous centre of our planetary system. The Trustees of this Park may be congratulated on obtaining an amendment to two previous Acts of Parliament, and of the prospect of shortly uncorking this bottled-up sunshine, and adding Pontefract as a coal town to others in the Riding, thus contributing to the power, wealth, and potential energy of the United Kingdom.

MAGNESIAN LIMESTONE FORMATION.

If towards the sun-setting Pontefract is surrounded geologically by a vast coal-cellar, the town is equally fortunate in being bounded towards the sun-rising by the mighty formation of the Magnesian Limestone. The rocks of this formation may be divided into five bands or layers; the lower yellowish magnesian rocks, resting towards the west on a fringe of the Permian Red Sandstones of Smith and Sedgwick. The upper thin-bedded rocks are separated from the lower limestones by a bed of red marl, and overlapped in some places by layers of marls and grits. This magnesian formation may be called the backbone of Osgoldcross. It runs right through the two wapentakes nearly from south to north. It varies in breadth from three to four and a-half miles, and it is from eighty to one hundred yards thick.

At Brotherton, Knottingley, Cridling Stubbs, and Womers-

ley, the limestone is burned and sold for agricultural purposes. It has the property, when put upon land, of pulverising strong soils, and, to use a farmer's phrase, of fastening or cementing light ones; the Knottingley bed of limestone being held in high estimation by the farmers of the East Riding of Yorkshire and Lincolnshire. From the quarries at these places, and from South Elmsall, 100,000 tons of lime and limestone are annually sent away.

The limestone in the quarries about Pontefract, and also upon the estate of the Right Hon. Lord Houghton, at Glass Houghton and at Wheldale, is burnt into lime, and extensively used for building purposes throughout the kingdom; Wheldale lime being held in great favour by many architects for its cementing properties. The commercial value of the different beds of limestone varies considerably, but in the neighbourhood of Knottingley from £400 to £600 per acre is the marketable price. There is indisputable evidence in the fossils *Mytylus Squamosus, Terebratula Elongata, Axinus Truncatus, Nautius Frieslebeni,* and by chemical analysis, that the sea once inundated the area of the country now covered by the magnesian limestone formation, and that from some unknown cause the waters of the ocean were then decomposed in such a way as to permit very generally the precipitation of united magnesian and calcareous carbonates.

The analysis of the lower rock near Stump Cross gives as under:—

Carbonate of Lime	58·88
,, Magnesia	33·96
Sesqui-oxide of Iron	·83
Alumina (Soluble in Acid)	1·87
Siliceous Sand (Insoluble Residue)	4·04
Moisture, &c.	·42
	100·00

But the lower Permian Red Sandstone of Sedgwick and Smith, which forms W. a fringe to the magnesian limestone,

has also its value in the commercial world as well as to the geologist and to the chemist. This rock of Pontefract is the geological problem of the neighbourhood, and which is by no means solved. The facts at present known seem to show that it rests in some places unconformably on the upper beds of the coal measures, and that this sandstone rock was laid down upon the edges of the previously formed strata, so that this lower sandstone overlaps sometimes upon one layer and sometimes on another in tumultuous confusion, as may be seen at Glass Houghton, upon the carboniferous rocks.

From the different quarries between Darrington and Glass Houghton, 31,000 tons of this sandstone rock are annually excavated and sent to all parts of the country for use at the different iron foundries for moulding castings.

Darrington and Pontefract	840
Monkhill	17,640
Glass Houghton	12,520
Total Tons	31,000

These sand quarries are full of the bones of extinct animals, and the sand, from chemical analysis, would appear to owe its origin to the action of fresh water, as under :—

Mill Hill Rock.		Monk Hill Rock. (*Bos Longifrons.*)	
Carbonate of Lime	1·00	Carbonate of Lime	4·46
,, Magnesia	·55	,, Magnesia	2·89
Sesqui-oxide of Iron	1·78	Sesqui-oxide of Iron	2·33
Alumina (soluble in acid)	·72	Alumina (soluble in acid)	4·12
Insoluble Residue (Siliceous Sand)	94·42	Insoluble Residue (Siliceous Sand)	83·60
Moisture, &c.	1·53	Moisture, &c.	2·60
	100·00		100·00

BOS LONGIFRONS.

It was on the 29th of April, 1869, while some men were excavating this sand at Monkhill, that the bones of an animal were exhumed. At a depth of about twelve feet from the surface of the ground they saw what appeared to be

the skull, jaws, and horns of some creature. They got out some of the teeth, horn cores, and other bones, when the soil above them fell into the sand pit in which they were digging, and the remaining bones were again buried.

The bones and teeth taken out of the pit, and which I now produce, have undergone disintegration from exposure to the atmosphere. That the animal to which these bones belonged fed upon herbage such as Pontefract Park might once grow, I think the teeth confirm. That it was an animal somewhat smaller than the present race of oxen, the *Humerus* and *Scapula* indicate. That it was a short-horned animal the horn cores sufficiently testify. Although the skull, jaw, and ribs are wanting, Professor Owen, who has examined these bones, identifies them as the bones of the *Bos Longifrons*, Long-Fronted or Small Fossil Ox.

No whole skeleton of this animal has ever been found—its bones have been dug up with those of the Reindeer, the *Bos Priscus* and the *Bos Primigenius*, and with Roman antiquities; from which it is inferred that this fossil species continued to exist after every other Pliocene Mammal had died out. It was but the other day that the thigh-bone of one of the extinct species of deer which existed in this country in pre-glacial times was found in a crevice of limestone at South Elmsall, and I found another at Monkhill, near the *Bos Longifrons*. There is evidence, then, that the *Bos Priscus*, *Bos Primigenius*, and the *Bos Longifrons*, whose fossil histories date from the time of the Mammoth, continued to exist in this island not only after it became inhabited by man but after it was conquered by the Romans. Perhaps this small short-horned newer *Pliocene* ox is still preserved in the mountain varieties of our domestic cattle; if so, the *Bos Longifrons* forms the connecting link between man's appearance with the present race of domesticated animals, and the wonderful changes which have taken place in pre-historic Mammalian Fauna,

down to the humblest organism yet discovered, the *Eozoon Canadense* of the British North American Laurentian Beds.

The conclusion of this Paper was followed by several rounds of applause, which were broken by the noble Chairman rising to invite discussion. In doing so, he said that the lecture, or rather oration, to which they had just listened (and which had been delivered throughout without the aid of any note), was one which few men would be capable of delivering. He knew not which to admire most—the learning, clear diction, remarkable illustration, or admirable delivery displayed.

Mr. Sykes Ward said that there was one part of the Paper in which he differed from the reader; he believed that Mr. Tew had given far too glowing an idea of the value of the mineral wealth under Pontefract. They might geologically discover that they had sixteen or seventeen beds of coal, the one underneath the other, but they had no instance on record that it was possible to work that number; and moreover, it frequently happened that coal which might be traced continuously in a bed, was of much less commercial value in one position than in another. They ought to know something of the commercial value of the coal in its relative position before they allowed themselves to be deluded into the waste which was now going on. He feared that even within a century they would find their manufactures very much impeded and deteriorated from the destruction of our coal fields. Sometimes the getting of coal from a lower bed quite injures and destroys that in the upper bed; similarly the getting of the coal from an upper bed causes water to accumulate in such a manner, that it is afterwards impossible to work the coal in the lower bed. As Secretary of the Society, he wished to state that they would be extremely glad to receive some short Papers, giving practical details as to the most economical way of working our coal fields.

ANCIENT BATTLEFIELDS IN THE SOUTHERN PORTION OF NORTH HUMBERLAND; SHOWING HOW PONTEFRACT OBTAINED ITS PRESENT NAME. BY REV. SCOTT F. SURTEES, RECTOR OF SPROTBROUGH.

In the days when we elder ones were educated, we were taught "to live and learn;" but since then so much has been altered, the England of our youth is so changed,—its schools and school histories almost as much as its means of locomotion. Well! those of us who have profited most by what is passing around us have taken as our motto, and found its value, "live and unlearn." If this is needful in things political and social, much more so is it in researches historical and archæological; there are so many intelligent minds occupied upon these subjects, they who are seeking after truth for truth's sake, determined to follow it wherever it may lead, have such great advantages, there is such an interest generally aroused in the country upon such subjects as those we are met to discuss this day, that it is no wonder as old opinions are brought face to face with the day, and the new light—from the publications of original documents, and the different readings of ancient MSS. as collated one with another—turns its "bull's eye" of truthful earnest investigation on many a dark corner of so-called history, that the historian who has parrot-like repeated by rote what he found written afore, finds that statements which he fondly hoped would never have been investigated or looked into, are suddenly ruthlessly questioned and brought to an ordeal which he little recked of. We live in an age when shams go down fast, and when the heresies of a few years back are received as orthodox truths, and darkness which might be felt is exchanged for the full blaze of the light of the nineteenth century.

A stubborn adherence to facts, in the face of evidence, is, however, not uncommon, especially amongst archæologists. We all of us bring prejudices, more or less, out of our nurseries, and the small modicum of history which was flogged into us at school haunts and disturbs our judgment in later years. It has been well put, that there is no progression in historical inquiry without retrogression; at any rate, I myself feel that many of my earlier ideas on archæological subjects have to be recanted, and it would be a want of moral courage not honestly so to do.

I shall have to ask you this day for great indulgence. I shall have to bid you draw largely on my motto, "live and unlearn," to give up many cherished opinions—much that you have studied or read or taken for granted connected with one of the most important eras of our country's history, and shall lay before you proof, convincing, I hope, to each and all, that what I state commends itself to your intellect and reason and common sense. I am one of those who believe that this North Humberland, *i.e.*, the country North of the Humber, taking the words in the widest signification, was the cradle of Britain's greatness. I believe the Brigantes were first and greatest in prowess when Britain was first known to the civilized world; that the Romans in their might dwelt here "within the wall, on the south side of it," as Bede informs us; that it was at their chief town that emperor after emperor resided, and the main body of their legions had their home; that not far from hence was their first great colony, Camulodunum. "Brigantes fæmina duce exurere coloniam,"—Tacitus. Polydore Virgil—"Puto Cambodunum Doncaster aut Pomfrid. Ptolemy—"Southernmost amongst the Brigantes, near the Parisi, below York," "twenty minutes more northerly than York." It must have been situate amongst the Brigantes, for Tacitus tells us Claudius took "Cunobelin's royal city of Camulodunum," and Seneca

tells us that campaign was against the Brigantes. Two Roman camps yet remain in this neighbourhood, one on Sutton common, and the other on the banks of the Went opposite Castle Hill.

It was also "near Eborac liand by Humber flude," that Hengest the Jute (you may call him Sassenach, if you like: was he one? In the poem of Beowulf—see Lappenberg, vol. 1-27—Hengest is expressly said to be a Jute, who had been sent to invade Frisia by Halfdene, a Danish king: this is one thing you have to unlearn) and his followers were settled as an advanced guard against the Picts and Scots; it was here in the North that Arthur grappled with them and overcame them. True, that afterwards the Anglo-Saxons held rule for a time, but soon the Northmen evicted or enslaved them, and themselves divided and colonised and tilled the lands: not Saxon, but Scandinavian, are we. Ethelward's Chronicle—"Halfdene settled in Northumbria and portioned out the lands." Book of Hyde—"York, the inhabitants had had much intercourse with the Danes and become like them in speech." Gaimar, A.D. 870—"No Dane had rest until this country North of the Humber was conquered." It is to these Norsemen we owe our free institutions and love of liberty, it is Norse blood that flows in our veins, the Norse language that lingers in our talk!

When Tosti was ejected, the reason given was (William of Malmesbury), that they were "free born and free educated." It was here that free institutions took deep root, the gradual adoption of which have made England what it is. It was not the Wītenagēmot nominated by the King, but the meeting of the Thing-men, "udal born," which contained the germs of a people's Parliament. It was the democratic, and not the monarchical, which was the leading element. Wessex is but as of yesterday, as compared with Northumbria; and London became great amongst the Southrons only

because it was, like its sister Dublin, a colony of Norwegian or Danish lithsmen. "At first," says Professor Morley, "every man of genius seems to have been a North-countryman, and it is in Yorkshire that we find the birth-place of our literature. . . . It is the region also of invention and commercial enterprise, that made us traders with the world." In all that relates to progress, socially, commercially, politically, we yet hold our own; and in the senate and the cabinet the North country element fills no mean position. I press these points upon you—you will never read the history of your country aright, never solve many a social puzzle in legislation, unless you bear in mind that this England of ours contains different races, that centuries have not welded them into one; that if our lot is cast amongst the Southrons, it is as dwellers in a strange land, our ways are not their ways, our manners not their manners, our modes of thought not their modes of thought.

At the period I have just mentioned, when the men of the North proclaimed themselves "free born and free educated," Wessex was subject to the grinding tyranny of the Dane, and Godwinsons were paramount at Edward's court.

Well, I am about to speak of pre-Norman times, of those great events which took place in this Southern part of North Humberland, in that eventful year which succeeded the death of Edward the Confessor, and before the Conqueror had made good his footing in our land.

Before I enter upon my subject, there are some points which it is necessary to bring before you, to enable you to comprehend more fully the subject of my lecture.

Firstly. Disabuse yourself of the idea that we in the North are Saxons. The predominant race amongst us is Scandinavian: it may be either Danish or Norwegian, but the leaders and majority of settlers were either one or the other. As the Danish or Norse faction predominated, so their party

rulers held sway or were hurled from their thrones. For two centuries or more, spasmodic efforts were made, and sometimes with success, to gain for the Southerner a nominal superiority; but it never meant much more, after Halfdene's advent, than the allegiance the Viceroy of Egypt holds to the Sultan, and for practical purposes was null and void.

The Yorkshire dialect, the Yorkshire speech, the Yorkshire race, has in it little element of Saxon, much and most of Scandinavian. Professor Worsae, of Denmark, says:—"The popular speech in the North of England is especially remarkable for its correspondence with the dialects current in the Danish peninsula." . . . "The Jutland resembles the English language more nearly than other sections of the Danish language." The Rev. J. C. Atkinson, in his introduction to his *Glossary of the Cleveland Dialect* (a book which no library is complete without, and which I would earnestly recommend every North-countryman to purchase or consult), shows that out of 119 names of places in a given district investigated, 67 are indisputably of Danish origin; that 75 per cent. of the Domesday names of this Yorkshire district are certainly at least old Danish or Norse; that in Domesday the old landowners were almost exclusively Danish; that out of 27 names, only 2 are Anglo-Saxon; that out of every 100 words, only 10 per cent. are Anglo-Saxon.

Secondly. You must remember that England, however galling it may be to our national pride, had been utterly and entirely conquered by these Scandinavian Vikings, the spirit of the dwellers in the South had been hopelessly broken. The Danes had crushed them down to a miserable and abject slavery. "England has been many times conquered by foreigners, by which means it changed its citizens and population and names."—Chronicle, Wavrin.

"The Danes kept them in a very degraded position, and

often did them dishonour. If a hundred met one of them, evil arose if they did not bow themselves to him; and if they came upon a bridge, they were required to wait: it was a crime if they moved before the Dane passed. In passing, every one inclined himself, whoever did not, if he were taken, was shamefully beaten. In such vileness were the English." —Gaimar.

"It must be recollected that these strangers made the country entirely their own. Halfdene divided Northumbria amongst his followers, who tilled and sowed the lands which they had won. . . . The conquest of the Anglo-Saxons by the Danes appears to have been as complete as that which was effected at a subsequent period by the Normans."—*Rise and Progress of the English Commonwealth*, by Palgrave.

"The old Anglo-Saxon names gave place to Danish appellations."—William of Malmesbury.

Then recollect there were two parties of these conquerors in England. The Norwegians, who for the most part occupied the North, and the Danes, who, monopolising the name of both in after writings, generally speaking, were the masters of the South. At home, in Norway and Denmark, as all the Sagas witness, they had ever and always a duel going on; for a time they might lay aside their enmities, and make a joint cruise or descent upon some unguarded shore, but the normal state of these two nations was one of constant hostility. As at home, so abroad; as they fought against and devoured one another in their fatherland, so also they did in their land of adoption. You cannot read English history aright, at least that deeply interesting part which preceded the coming of William, without taking this with you as a clue whereby to unravel the twisted skein. Put out of your thoughts the enslaved and conquered English, the battle for dominion was fought out between the partisans of the Northmen and the Danes.—*War of the Gaedhill with*

the Gaill: Preface, edited by Todd. (Irish.) "Two distinct parties of Scandinavian invaders, the azure Gentiles (in old MSS. Lochlannos). The white, or fair-haired, Norwegian. The black, or dark-haired, the Danes. The two nations constantly fighting."

"The Black Lochlanns and the White Lochlanns came to help Sitric."—Gaedhill.

Also, see *The Brut y Twysogion*, A.D. 795.—"The battle between the black Gentiles and the fair Gentiles, and the black Gentiles driven out of Ireland."

"The black Pagans first came to the island of Britain."

"Tham of Norwei and the Danes Oste."—Langtoft.

"The good Norays and the false Norays."—Langtoft.

"The Duke of Normandy belonged by blood and habits to the race which had produced Regnar Lodbrok, Hingwar, and Hubba; Halfdene, Hastings, and Rollo."—St. John's Four Conquests.

Now if this be history, and if the statements of most chroniclers, as well as the testimony of local nomenclature and the indubitable evidence of a Scandinavian tongue spoken in this land North of the Humber bears it out, we shall expect to find that Scandinavian customs, common to free men, are Northumbrian also. "They had their house things, their court things, their general things, their thing men." I am quoting from *Laing's Kings of Norway.* "Sweden had its Lag thing, in each of its five different divisions, and at Upsal, the chief thing, where its king must be elected. The Ore thing, at Nidaros, in Drontheim, could alone confer the sovereignty of Norway. Cnut must go to Drontheim and call a thing before he could become king; Magnus must go to Denmark and call a thing at Viburg. "The Danes elect their king at Viburg, in South Jutland." So, similarly, each separate district had its separate place of meeting, no doubt, in Northumbria also; and one spot,

hallowed above all others by tradition and association, where, as at Scone and Tara, its chief must receive the kingdom. This very Harold, of whom we speak, says, "He must go to Viburg thing, and get himself proclaimed king of Denmark." As to local things, we have "Law-ton," or, Laughton-en-le-Morthing, in this Southern district. I believe it would much help to elucidate our history if we looked about more closely for these leading places, memorable in olden time, around which are grouped and gathered all the interest and tradition of each separate race. There are strong testimonies everywhere to this ancient custom.

We shall find as we go on how important its bearings on the subject; thus Mr. W. F. Skene, on the coronation stone, traces its history to the earliest period:—"The kings of Scotland, first of the Pictish monarchy, and afterwards of the Scottish kingdom . . . were inaugurated on this stone, which was never anywhere but at Scone, the *sedes principalis* of the Pictish and Scottish kingdom. The stone seems to have been eight centuries at Scone, before it was removed to England, 1296."

Travels in Dolomite Mountains, by J. Gilbert.—Carinthia, "at Karnberg, six miles north of Klagenfurth, its capital, is a stone block, on which the dukes of the country sat when installed. A little farther off stands the most ancient church in Carinthia, and thither, after installation, the duke repaired to hear mass, viz. the old church of Maria Saal, where the second rite of investiture was performed; and at no great distance is the Hezrogs Stuhl, where the sovereign princes seated themselves to receive the homage of their vassals, and take the oath to administer justice impartially, and there stands that coronation seat, though the race of rulers for whom it was intended is vanished. It is of the rudest construction, consisting of hard unpolished slabs. This venerable relic stands in the midst of an open common."

Pilgrimage in Old Servia, by P. Irby and Mackenzie.—"The old church still there; minster of Dēchănĭ; opposite the altar two stalls, one the bishop's, the other the old marble seat of the Serbian kings."

Baedeker's *Rhine*.—"The Donnersburg dedicated in ancient times to the god Thor, called by the Romans Mons Jovis. The upper part a tableland. The Konigs-stuhl, a porphyry rock, on which the Franconian kings and the courts of the Wormsgau are said to have held their tribunals. So also near Stolzenfels, on the Rhine, Konigs-sthul. . . . The Emperor Maximilian took the oaths when on his way to his coronation at Aix-la-Chapelle. . . . Near here, in A.D. 1400, the Rhenish electors deprived the Bohemian king Wenzel of his imperial crown. On the following day they crossed the river to the Konigstuhl, and elected the Count Palatine Rupert III. in his stead."

So at Pesth (Murray's *Handbook*) is the seat of the chief judicial tribunals of Hungary: "they are called Konig-liche Tafel, or Royal table and Septemviral Tafel, because originally of seven members. It is the supreme court of appeal in the kingdom. In the field of Rakos, the Diet, the great national assembly of the Magyars, was anciently held in the open air."

"Close to Presburg, a hill called Konigsberg, to which the king repairs after his coronation, and makes the sign of the cross with his sword."

History of Germany, by W. Menzel, p. 23.—"The thing, or dingstatt, under a great tree, ash or oak, or by enormous stones. . . . The centre of union in olden time, not a king, but a popular assembly in some sacred spot."

I have said that one of the most important eras in the history of our land was that year of sensational events which followed the death of Edward the Confessor—each party had long been waiting for this event, and the silence was like

that which precedes some great convulsion of nature. The antagonism of centuries, and the hatred of race brought by these Vikings from their Scandinavian homes, culminated in one fierce death grip, when the last of the Saxon kings, who, Norse in his sympathies, but Danish in his ministers, held the balance between the two factions, until his death left the prize for an open contest. The day of his death found Harold Godwinson king; the day of his funeral witnessed, with untimely haste, Harold's coronation. When William meditated invasion, he knew there was a large party who favoured their kindred Northerners. Himself of the same lineage as the masters of the North, he had a party ready to assist him. Wessex might hold to the side of Harold, but not Northumbria, and Mercia and London would be doubtful. Godwin and Godwinson were no Englishmen at all, they were of Danish race and Danish feeling; they had that poor weak creature, Edward the Confessor, under their iron rule, and, spite of his struggles, they kept him in their grip.

They held their position by means of their armed retainers or huscarles, and their rule was cruel and oppressive to the natives. In the North, they who had ejected Tosti, a Godwinson, "because never a Dane should reign over them,"* (Dux would be nonsense,) would be ready to take part with a king of Norway, or duke of Normandy, and that welcome, not without reason they counted on, they received.

This will account for what must otherwise seem so strange, that after the loss of one battle England lay at William's feet. When Harold's personal followers, his own bravest mercenaries or huscarles, perished at Standford Bridge, the fortunes of his race were done; "of the people there

* Bonnechose, Livre iii., c. iii.—"Se homines liberè natos, liberè educatos nullius daci ferociam pati posse, a majoribus diduisse aut libertatem aut mortem." William of Malmesbury, p. 83.—La dénomination de danois (Dacus) donnée ici a Tosti fils de Godwin et de Githa, sœur du roi de Danemark, est digne d'attention.

were few with him," knelled the doom of the Danish faction (Malmesbury).

I am now about to treat of the *so-called* battle of *Stamford* Bridge. What are the events which preceded this memorable battle? a battle, remember, on which the fate of England hinged, a battle which, according as it was lost or won, affected the position of the English nation for generations. If Harold Sigurdson, the king of Norway, had not landed, and in that hard-fought battle slain the best and bravest of Harold Godwinson's (the leader of the Danish faction in Wessex) huscarles or standing army, the event would probably have been different, when within a few days he met and fought with William at Senlac. The raw recruits he pressed into his service were not like those favourite huscarles who died in that fierce fight, or rather, three fights in one, which lasted all that day from early dawn to evening close, and found them few in number, but victorious, with Harold of Norway and Tosti, the two leaders of the Norwegian host, dead, and the main body of the foe discomfited and either flying or slain: a slaughter so great, that in after ages the bones of the unburied dead still lay in heaps upon that plain.

> Like the leaves of the forest, when summer is green,
> That host in the morning all radiant were seen;
> Like the leaves of the forest, when autumn has blown,
> That host in the evening lay scattered and strewn.

Orderic Vitalis (mark this well), A.D. 1141.—"The place of battle is easily discovered by travellers, where great heaps of the bones of the slain lie there unto this day, to bear witness of the prodigious number of both people which fell."

What were the steps which led up to this campaign? Tosti, seemingly once the favourite of Edward and his wife, had been supplanted by Harold and banished. Brother-in-

law of William, it was not unlikely he would ally himself with him against the brother who deserted, even if he did not scheme against him, in his utmost need. On Edward's death, the plan, no doubt before agreed upon between them, was carried out by Tosti. William gives him ships, he turns Viking, and harries the English coast. From thence he is said to go to Denmark, and finding no help there, is more successful with Harold Hardrada, king of Norway. He becomes "his man," promises that many of the Northumbrians will join his standard, which promises were fulfilled. An expedition, on a much larger scale than had ever before been attempted, leaves the fiords of Norway to conquer England. England was to be to Norway what it was to Denmark in the time of Cnut; two hundred ships, besides transports for provisions, in all making five hundred (Gaimar says four hundred and seventy), bear this mighty armament on its way. It would seem, from after events, that while Tosti and Harold of Norway were to land in the North, William was to act simultaneously with them in the South. The old men see visions, and the women dream dreams; but not such old wives' tales daunt Harold the Hardy!

At Orkney, he leaves wife and daughters; at Klifland (Cleveland), he plunders; Skardaborh (or Scarbro'), he pillages and burns; and to proceed, in the words of Snorro *(Laing's Translation of the Saga of the Kings of Norway)*, brought up at Hollow-ness (Holderness), "thereafter the king sailed to the Humber, and up and along the river, and then he landed. Up in Yorvick were two Jarls. King Harold lay in the Usa: a battle was fought at Fulford; the Norwegians were victorious. After the battle now told of, all the people in the nearest districts submitted to Harold, but some fled. A thing is held; the people gave him hostages, the children of the most considerable persons of the

town, 'Jarl Tosti, well acquainted with the people of that town,' and laid his army at Stafnfurdo-bryg. *The king returned down to his ships.*" Thus ends act the first.

"A thing appointed for Monday morning *early*, to settle the affairs of the kingdom. The same evening (*i.e.*, that Harold of Norway had returned to his ships) came king Harold of England, Godwinson, from the South to the castle, and rode into the city with the good will and consent of the people of *that castle*. All gates were shut, and the army remained that night in the town. On *Monday*, Harold Sigurdson ordered trumpets to sound *to go ashore*. The weather was fine and hot sunshine,—one-third left to watch the ships. As they came near *the castle*, a great army seemed coming against them. The men had come to land but half equipped. A cloud of dust reveals their presence. Tosti says, Let us turn about as fast as we can to our ships (they could not have been far off) to get our men and weapons. King Harold says, Let us send three horses and three of our briskest lads, and let them ride with all speed to come quickly to our relief. King Harold set up his Standard, the Landreyda or Land-ravager. The infantry were drawn up in a hollow circle (the Shield borh) or Shield fort, shield linked to shield, and their spears driven into the earth before them, to receive cavalry. Jarl Tosti, at another place, had a different banner. A parley takes place with him, he is offered half the kingdom for himself, and when he asks what for Harold, his ally, the answer is, "Six feet of English earth, or as much more as his length exceeds other men." "Ride back," says the indignant Tosti, "to your master, and let him arm for the fight, for never shall it become a truthful tradition amongst the Norwegians that Jarl Tosti forsook their king in the land of his enemies. The English cavalry sweep down on the Norwegians; Harold, unarmed, rides about encouraging his men, and chanting his

lays as he fights with his accustomed vigour, as the Saga describes him :—

"Where the battle-storm was ringing,
Where the arrow-cloud was singing,
Harold stood there,
Of armour bare,
His deadly sword still swinging;
The foemen feel its bite,
The Norsemen rush to fight,
Danger to share—with Harold there,
Where steel on steel was ringing."

An arrow or bolt pierces him in the neck, he falls dead. After Harold's death, Tosti has the charge of the king's Standard. Tosti, in turn, bites the dust. But Lrystein Orre, left in command of the ships, and his contingent, now arrived, "all clad in armour." "They had come so fast, they were exhausted, and hardly fit to fight, before they came to battle. They were offered quarter; they refused it. They threw off their coats of ring-mail, and many fell from weariness, and died almost without a wound. This happened towards evening; many fled, and darkness fell before the slaughter ended."

So far we have the events described in the Sagas of the kings of Norway.

Florence of Worcester, the Chronicle of—

"After this, Harold Harvagra, king of the Norwegians, and brother of St. Olaf, the king, arrived on a sudden at the mouth of the river Tyne, with a powerful fleet, consisting of more than five hundred large ships. Earl Tosti, according to previous arrangement, joined him with his fleet. They hastened their course, and entered the river Humber, and then sailing up the river Ouse, against the stream, landed at a place called Richale. King Harold, on hearing this, marched in haste towards Northumbria; but, before his arrival, the two brothers, Earls Eadwin and Morcar, at the head of a large army, fought a battle with the Norwegians on the northern bank of the river Ouse, near York, on Wednesday, being the Vigil of the feast-day of St. Matthew the apostle (20th September), and they fought so bravely at the onset that many of

the enemy were overthrown. But, after a long contest, the English were unable to withstand the attacks of the Norwegians, and fled with great loss; and more were drowned in the river than slain in the field. The Norwegians remained masters of the field, and having taken one hundred and fifty hostages from York, and leaving there one hundred and fifty of their own men as hostages, *they went to their ships.* Five days afterwards, that is, on Monday, the 7th of the kalends of October (25th September), as Harold, king of the English, *was coming to York*, with many thousand well-armed fighting men, he fell in with the Norwegians at a place called Stamford-bridge, slew King Harold and Earl Tosti, with the greater part of their army, and gained a complete victory; nevertheless the battle was stoutly contested."

What, then, do we learn from these accounts? Florence of Worcester tells us that the place the Norwegians landed at on the Ouse was "Richale."

Simeon of Durham does the same—"Up the river Ouse, at a place called Richale." Peter Langtoft, a Yorkshireman himself, gives us more exact information—"En le braz de Ouse suth Rychale;" "in an arme of Ouse suth Ricall lai." Roger of Hovenden (or Howden, in the immediate neighbourhood), says, "They take and leave also from York one hundred and fifty hostages, and *return to their ships.*" Geoffrey Gaimar fixes the locality more closely—"From the Humber they went to the Ouse, and disembarked at St. Wilfrid's" (Petrie notes this as Brayton, where is St. Wilfrid's church, and gives the number of their ships as four hundred and seventy). The "Kronicle Danmarkts Kigis," printed A.D. 1652, says, "It sted heeder Ricale." This Danish Kronicle also states that they took one hundred and fifty hostages from York and "drog saa til Stibs igien." It also agrees with the English, that it was five days after, that as Harold Godwinson was coming "til Eboract" ("til" *towards* York) he fought with Harold of Norway and Tosti, at "Strand for brygge."

The Saxon Chronicle,—indeed all authorities,—unite in

stating distinctly and positively that they, the Norwegians, "*went back to their ships.*" Now the place of battle is seldom, save by modern authors, I believe, called Stamford bridge. The Saxon Chronicle, which gives different accounts in different MSS. of the battle, says, "aet Steinford brygge," "Staengfordes bryege." Peter of Langtoft—Staynford and Staunford. William of Malmesbury—Standford Brigge and Stant-ford bridge. Thierry says, "Sortit du camp sur l' Humber." Pere d' Orleans (Paris, 1737)—"Their camp was where their ships were at anchor, with their left on the Humber." Roger of Howden—"Standford bridge." Peter Langtoft says, "They have one hundred and fifty hostages from York in their power. News come that Harold, son of Godwyn, is coming to destroy them. The Norwegians pass thro' the meadows to Staunford brige—Staynford brigge—and all take lodging there; king Harold came upon them, his standard displayed." "They fight from *morning* until evening. King Harold and Tosti slain. In the morning it was he mette with his enemys, all the day they fought, at even he had the pris." Chronicon Manniæ—Steinford brige. Now we have arrived at this point for certain: that the Norwegians went back to their ships; that their camp was situate on the Ouse, near the Humber, "South Ricall," at St. Wilfrid's, and that the battle has the name of Stand-ford Bridge or Staynford, but seldom that of Stamford. Five hundred ships would, when at anchor, from below Ricall reach at least to Selby. Next we have an account of Harold Godwinson; he, it appears, marched his army in seven divisions, and then "on Sunnandœg; Harold, king of the Angles, arrived at *Tada*"—(Saxon Chronicle). We have learnt from the Saga, that this was the same evening that Harold Sigurdson and the Norwegians left, "went *to their ships*, and agreed to full peace, so that they should all go with him south and this land subdue." We have also

learnt from the Saga that there was a thing appointed for *Monday morning early*, and that Harold Sigurdson did disembark *from his ships* to go to this thing—"there, from all the shire, hostages would be brought to meet them." "Early in the morning," the battle did begin: Henry of Huntingdon and Peter Langtoft tell us this. Brut-y-Twysogion—"Harold, unarmed and unawares, surprised by Heralt Jarl, son of Gotwin Jarl, and by sudden attack, aided by national treachery, slew." (Saxon Chronicle—"unawares *beyond the bridge.*") It must, then, have been some place near "Tada," and *within reach of the Ouse, "South Ricall."* But where was Tada?* Why, we know from Domesday it was this very place where we now are met. Kirkebi, Danish, and Tateshalle, Saxon, names for Pontefract. (A recent writer adds "ceastre" to the Tada of the Saxon Chronicle, and manipulates it to suit his purposes into Tadcaster!) Strange, that since this was written "the Surtees Society" has edited the works of Simeon of Durham, and there it is stated that when the chief men of Northumbria swore allegiance to Edred, A.D. 949, they came to Taddenesclyf (Florence of Worcester, and Saxon Chronicle); and, most satisfactory to me, I find this singular note. There is in the margin of the MS.: "Taddenesclyf erat tunc villa regia quæ nunc vocatur Puntfrait Romane, Anglice vero, Kirkebi." Ness is, as you are all aware, a promontory, it may be of any sort, either on the human face, or a headland in shore or at sea. There are "nesses" near here, and everywhere in the north: at Cawood Cawood ness, at Drax New Haagness, the nesses at Ricall, &c. Saga—"Guthron, in answer to king Olaf: I would have the whole ness that goes out into the lake sown with corn; on that ness there are ten farms." Here, then, is Tada-ness-cliff.

* Tada, or Tate, was another name of Ethelburga, wife to Edwin; and it was near a villa regia, in Northumbria, where a Witenagemot was being held, that the events occurred which made him a convert to Christianity.

It was here, on that cliff, as they came near that castle (Kastel, Danish), that they encountered Harold Godwinson. Here, throughout the lofty cliffs, above and along the banks of the Went, are rocks scarped and entrenchments everywhere to be found; a position, the first rising ground and strongest, as you sail up "Humber flude"; and here, as Laughton-en-le-Morthing in Northumbria, and Upsal in Sweden, a thing mound, flattened at the top. It was thither they were going to renew the kingdom, and, as at Upsal, Nidaros, Viburg, and all the other places I have fore-mentioned, Harold, like Edred, must there receive the kingdom. The next stage in the eventful proceedings of that remarkable day, is the battle itself. I have the greatest faith in local nomenclature; and here, just within sight of Tada, within reach of Ricall, St. Wilfrid's, Greave-field, Standing-bridge, Castle-hill, King's-Land-wood, we find KING'S STANDARD-HILL, KING'S STANDARD-WOOD: it was here, surely, that king Harold Sigurdson's Standard was set up, and the "Land-ravager," or "Devastator of the Earth" was unfurled, for the last time victorious. It was here that Harold Hardrada fondly hoped he could hold his own until his reinforcements from his ships near Ricall should arrive. From early morn, all day long, the wave of battle surged and broke around that Standard Hill, and it was not until the sun was westward in the horizon that the little remnant of that gallant host turned their backs upon that field where, with Harold the Hardy, the hero of a hundred fights, and Tosti his companion alike in arms and prowess disdaining to purchase a kingdom and safety at the cost of life and honour, lay the best born and bravest of the Norwegian people, in huge hecatombs, dying and wounded and dead! There, where memory and tradition and local nomenclature have ever called the spot by the old Danish-spelt name of Greave. "Grove" is but of yesterday; in the tithe or inclosure map of

1799 A.D., in the custody of your courteous postmaster, you will find the district and every place and all connected with it, time after time called Greave field, Greave, Greave lane; and in a map, many years of older date, done for the Marquis of Rockingham, with the ancient roads and names of this part of Yorkshire, in the possession of Earl Fitzwilliam, I find the same testimony—the same spelling of the Norse-word Greave. "This happened toward evening, and the darkness fell before the slaughter ended," is the simple, but pathetic statement of the author of the Norwegian Saga. But why was that triumph so long delayed? William of Malmesbury—"However reluctantly posterity may believe it, a single Norwegian for a long time delayed the triumph of so many and great men; for, standing on the entrance of a bridge called Standford Brigge, after having killed several of our party, he prevented the whole from passing over. He reproached them as cowards, and, finally, while vapouring about was transfixed by an iron javelin." The army immediately passed over without opposition, and destroyed the "*dispersed and flying Norwegians.*" Now mark: when the bridge was forced they came upon the "dispersed and flying Norwegians." This shows that Harold Godwinson's forces were in two divisions, and that one had already dispersed the Norwegians on the other side of the river. This entirely overturns the fiction that the Norwegians were this side of the river between York and Stamford Bridge. To this agree the several accounts from the different MSS. of the Saxon chronicle—"The English hotly slew them from behind until they came to their ships." Another account, whilst stating that Harold had come upon the Norwegians "unawares from beyond the bridge, and that they were fighting boldly long in the day, and that the Northmen fled," goes on to give the story of "one of the Norwegians who withstood the English folk, so that they *could not pass over the bridge to obtain the victory.*"

Henry of Huntingdon, who gives many minute particulars which others do not, says "the armies were engaged from daybreak to noonday." He also states that "the Norwegian who took post on a bridge killed forty of the English with a battle-axe, and *stayed* the advance of the whole English army until the ninth hour." Harold Godwinson then had clearly made a detour, "qui avait marche de maniere à eviter les postes enemis," as Thierry puts it; he had most probably pushed on with his cavalry, whilst his main body came on by Watling Street to Tada; it is evident he was on the other side the bridge, as when *the whole army* had forced a passage they fell upon the "dispersed and flying Norwegians," and made the defeat a rout. In those days, armies when they marched must have followed the main track ways. We have an account of the highway from Pontefract to York, such as it was, in Orderic Vitalis: "When William passed Pontefract the road now lay through forests and moors, and over hills, and along valleys, by paths so narrow that his soldiers could not march two abreast; in this way they at last reached the neighbourhood of York:" and yet it is over roads of *this* sort that our writers of philosophic history would fable them to march 18 or 20 miles, from Tadcaster to Stamford Bridge, and arrive "in the early morning;" or, *vice versa*, Harold of Norway to send for reinforcements from his ships, which, spite of the dreadful heat of that day, come up in time from "Suth Ricall" to take part in the contest! It is just simply an impossibility, it could hardly and with difficulty be done from Brayton to King's Standard Hill.

If, then, the Standford Bridge could not have been the other side of York, where then is this bridge to be looked for? Why, here—"Standing Bridge,"—near "Standing Flat," where the "Roman Rig" crosses the river Went. Note the curve it makes to take in the bridge, leaving the

ford to your right hand. "Stand, or Staae,"—to stop, to stay, to put a stop to (Danish dictionary); Atkinson's Cleveland dialect—"Stand,—to be stopped, not to be going, of a clock."

I do earnestly press upon my hearers that in this North of ours it is the Scandinavian, and not the Saxon, which is the ground-work of our language. What a wonderful incidental witness is borne to this fact by one of the after-events of this battle! Strykar, fleeing from the fight without his armour, meets with a Northumbrian peasant, and asks him to sell his sheepskin coat. "I know thee by thy tongue," says the peasant; "thou art a Norseman, I would I had a sword to slay thee." "But I have one," rejoins Strykar; cuts off his head, and takes his coat. Here is clear evidence that the Norwegian and the Northumbrian peasant understood one another, and that their folk-talk was only diverse in its Shibboleth.*

Only recently, in a Yorkshire paper, I read an account of a man telling another to come down from the "stee"—ladder; and those middle-aged gentlemen amongst you who declare that driving grouse is such first-rate sport, hear your keepers talking to you in Danish of "ligging pits." Your streets and roads are called "gates;" your fords, "wath or vade;" your Roman way, "Roman-rig;" your meadows, "ings;" your low lands, liable to floods, "flad or flats;" your election saturnalia, "hustings or hus-things;" in a bad temper you send your opponents to Old Nick, "Nokte;" your Christmas festival is "yule;" your very division of your county into ridings is a division of country still known in Norway.

One more evidence and I have done. Whenever I am in

* Mr. Atkinson, writing to me, says that Professor Worsae seems to consider that the termination "bi" or "by" is Danish, as opposed to Norwegian "bo" or "boer;" as also that "thorpe" is Danish, "thwaite" Norse.

doubt upon any point regarding the history of our country, I turn to foreign writers to find what they say upon the subject. As at Brussels, I found a history there which told me that the camp of the Norwegians was near the Humber; so, in Paris, I found a history which told me the locality of Standford Bridge. An English transcriber one or two hundred years after the event, would, if he found anything to militate against the received opinion of his day, most probably alter the text; the foreign historian, with no semi-local knowledge, would copy his MS. faithfully. There, in this old history of Normandie, picked up haphazard with the hope I might find some point bearing upon my subject, I note the following (evidently, from the type, an extract) copied from other and more ancient chronicle; and what do I find, but a corroboration which must carry conviction to every one unprejudiced that I am right? Speaking of this battle and the death of Harold Hardrada and Tosti, "*Les chroniques font mention d' un vaillant Norwegian qui defendit un pont, en un village nomme Pontfract lequel á lui seul empecha long temp les Anglais de passer. Cette dervute des Norvegiens eut lieu le* 25 *Septembre,* 1066, *pres de la riviere d'ervente.*" (Histoire de Normandie. Versailles, J. P. Jalabert.)

Is it possible that I could have invented this, that I could by any sleight of hand have foisted what suited my purpose into a book published before I was born? from whatever work that author extracted that sentence, it must have been from a written tradition of generations past. I had accumulated proof sufficient without this: it caps the capital.

May we not also find in the French chronicler a clue to the mistake? "Cette deroute eut lieu pres de la riviere d'ervente."

It is d' (apostrophe) ervente: may it not have been written thus—"De went," and as the river Went was not navigable, and, therefore, comparatively speaking, unknown, got con-

fused by transcribers with the larger Derwent, near which they had pitched their camp? It is but a slight alteration, not near so great or important as the extraordinary mistake which one writer has followed another in regard to this very battle. I cannot account for it, but it shows how easily a mistake once made is copied, one and all writing Harold "*Harfager*, or fair-haired," who had died a century before in his bed, for Harold "*Hardrada*," who met his doom in this battlefield in the Southern part of North Humberland! Then we have in our favour that soon after the conquest "Tateshalle" disappears, and in De Lacy Chartas the "village and honour of Pontefract" assumes its place. Why, and how, and wherefore this change of name in this important district? Does it not point to some important incident in connection with some broken bridge—Ponte-fract? You may see such a causeway as we may conjecture this may have been at Smeaton, a little lower on the Went; a ford below, and a raised causeway of stone with a couple of planks alongside for foot passengers. "Liable to floods" is written down still on the low lands round Standing Bridge; the valley of the Went and the whole of this district in old days, when the outlets of the Ouse and Humber were water-logged, presented a very different aspect to what now it does.

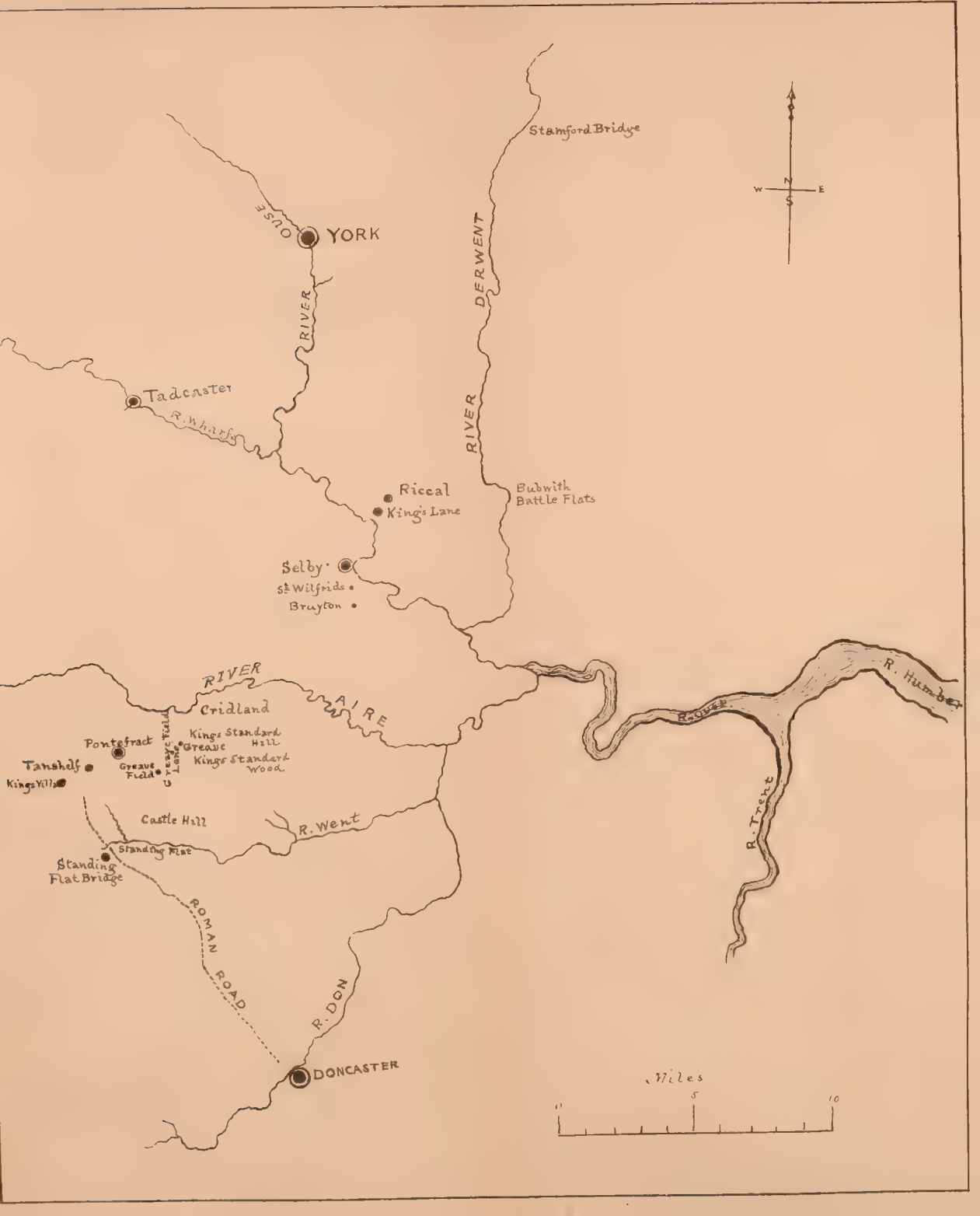
Lastly, what light does topography and a view of the country and the traditions of the past throw upon our subject? Stamford Bridge! no one can view the false or "Brummagen" spot without a conviction coming across him—Not here could Harold possibly have been taken "unawares," as we look at the dead level towards York; that not here could he, coming *to* York, at the same time have been surprised at the *other* side the river, "beyond the bridge." That it is simply impossible, as the writer of the romance in the *Quarterly* (October, 1868), on Yorkshire, would feign, that the bridge being carried they came upon the "*dispersed and*

flying Norwegians." Ask the natives there of a battle; one and all will give you for an answer, "Story, God bless you! we have none to tell, sir." The only glimmer of tradition that we can meet with is "Battle flats"; but then, alas! *bataille* is French, and could not be the language of the Northumbrian peasant of *that* day; and, if it is good for anything, there is a "Battle flat" near the Derwent, not far from Ricall, which it is within the reach of possibility might have been the scene of the conflict. It is true Kirkby's *Inquest*, two hundred years afterwards, does speak of "pons-Belli," but the natives never would and never did own the word, and it was never foisted into the nomenclature of their home. True, the writers in the *Quarterly* and Freeman's Norman History (370, vol. iii.) tell us that on the feast day in that secluded village the inhabitants make pies of pears in the shape of a boat or tub, in remembrance, not of Harold's *ships*, but of a man who got into a boat and went under the bridge and killed the Norwegian who defended it! Might not these writers, as they made their Yorkshireman talk French in one case, have fabled him to have done so in another, and have explained that pear was only broad Yorkshire for "pierre," and that it was in memory of "pierre," a stone in connection with a stone ford at the bridge, and the hot fight there, that these "pear boat pies" were on the feast day made "all hot"? Why did they not tell us that as Harold came to that out-of-the-way place in order that he might enjoy the "sentiment" of sleeping in the old (auld!) homes of Saxon kings (vol. iii., p. 355), that it was possible that "Aldby" commemorated the resting of the ark, and that it was from a recipe of that scantily-clothed dame, whom children in their play call Mrs. Noah, that the pies were made in a "boat-like" form! Why, *if* "pears" have anything to do with it, again we cap the writer of the article on Yorkshire with "Pear Tree Close" adjoining

Standing Bridge! It is strange how Mr. Freeman in his history has been mis-led by the writer of this article, and blindly followed him in his errors. How the Yorkshireman must have chuckled and put his tongue in his cheek as he told the seekers after traditions the story of the pears and the pies!

How different where tradition has a foundation in fact! I go to Ricall, I find King's-lane; I go to search the neighbourhood of Pontefract, and at once on asking about a battle at Cridland, person after person is forward to explain, "Do I mean King's Standard, or Standard Hill?" (Krid is Danish for chalk: is this the old Calcaria?) I ask if there are any barrows or places where bones have been found? a man comes forward to tell me that in the clefts of a quarry near Grove (or Greave) he had, when chalk-burning, come upon lots of bones in the fissures of the rock. I drive off to the quarry, and the wife of another quarryman tells me her husband had often found them and brought them unto her to show them—(I dare say she said, "T'meester is not in hoose," as you are startled to hear in Norway, "Is t'meester in huusen?"). I go to Stapleton to look for earthworks, and find them everywhere. I am directed to Castle Hill, and there I found a mound and series of excavations around, answering in every way to the description of the Thing mound—Laing's Preface, p. 88, vol. i. "Upsal Tings hogen or Tings mound, flattened at the top; circumference at base, 350 paces; ascent, 70 steps; height, about 90 feet." May not Knottingley be the meadows or "leys" of the Nord-thing, through the which *(the meadows)* Peter Langtoft tells us Harold Hardrada and his followers were marching to the thing which had been agreed upon, on that day, when by the treachery of those who had promised to meet him in peaceful guise and give hostages as proof of faith, he was surprised "unarmed and unawares"?

I should have liked to recapitulate more fully, and to recall to you some of the leading points which show that unless it was during the days of seven-leagued boots or the later ones of express trains, no army could have gone from *Tada*, be it where it may, *to Stamford Bridge, near York*, to fight "early in the morning," or sent messengers from thence to call up reinforcements from ships at the camp below Ricall! The distance, in both instances, is at once fatal to the theory. But there is one point which, indirectly, bears strongly in my favour—it is that the latest and most prolix of the historians of England has just published a volume of English history bearing upon this era and this battle; that in that volume of 768 pages, a large portion of it being a closely-written appendix in connection with the subject of this battle, after more than one view of the battle-ground, the author can make nothing satisfactory of it, and is driven to the strangest inconsistencies and evasions, in order to account for what must be unaccountable, and is led to a harsh conclusion, foreign to the gentle nature of one who would not tread upon a worm or hurt the feelings of a fox, viz., that all authorities, ancient and modern, are wrong, and that he alone is right! "The accounts in Lappenburgh, Thierry, and St. John, seem to have been written without any knowledge of the ground;" and, as to the Saga of Harold Hardrada, "I gradually came to the conclusion that that part of the Saga was mythical. . . . The Saga maker had to draw largely on his imagination"! and yet there were ballads extant which Snorro quotes with Harold's very words on this very battlefield, and Strykar at least escaped to tell his tale. In short, the whole of that laboured appendix on the details of the battle of Stamford Bridge is written to show that every one else but the writer of the history of the Norman Conquest (Freeman, vol. iii., pp. 352, 354, 357, 721) does not understand or comprehend the subject he is treating!


Stamford Bridge
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W
E
S
OUSE
YORK
RIVER
DERWENT
RIVER
Tadcaster
R. wharfe
Riccal
King's Lane
Bubwith
Battle Flats
Selby
St. Wilfrids
Brayton
RIVER
AIRE
Cridland
R. Humber
R. Ouse
Pontefract
Kings Standard
Greave
Hill
Tanshelf
Greave Field
Greave Field Lane
Kings Standard Wood
Kings Villa
Castle Hill
R. Went
R. Trent
Standing Flat
Standing Flat Bridge
ROMAN ROAD
R. DON
DONCASTER
Miles
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5
10

I have kept back this Paper for some time. I am glad it is so, as I have first read it where local knowledge can supply the severest criticism. It has always seemed so strange to me that the change of name of Pontefract could never be accounted for.* The associations of the place have ever had a fascination for the historian, and, if I am right, not without reason. If, further north, Scone was ever the place where Picts and Scots and their successors in turn were crowned, so here, it may be, did each successive sovereign, tyrant, or usurper renew the kingdom.

Not far from here, at least, was Camulodunum; here, it may be, was Tate's Villa Regia; and here Edred and Harold reckoned on receiving the allegiance of the dwellers in Northumbria. Hither, in post-Norman times, came Lancaster to strike a blow for the people's rights; up yon hill he was followed and hounded to his death by the roughs of Pontefract, though in after years they changed their note and considered him as a saint.

I will just ask you to follow my ruler as I point to the places which local nomenclature identifies *(see map)*:—Ricall, King's Rudding Lane, Dane's Hills, Brayton St. Wilfrid's, Bubwith Battle Flat, Cridland (Krid, Danish for chalk), King's Standard Wood, King's Standard Hill, King's Land Wood, Castle Hill, Standing Flat Bridge, Standing Flat, Greave Field, Greave Wood, Greave, Roman road or Roman rig, crossing the Went (mark how it makes a bend towards the bridge, showing how the old Watling Street crossed the ford); "King's Villa" (not a bad translation of Villa Regia), and, finally, Pontefract, still bearing the name which tells of that desperate fight and fearful slaughter which was so long delayed by the nameless Norwegian, who slew one after another of those who tried to cross that broken bridge: an

* P. lxxxii, Domesday Book, Tateshalle. Sal or Saal, chief residence, as Kursaal=Hal or Hall.

event so memorable that it is the main point that our English historians dwell on. It was within sight of that "Greave"-yard where the bones whitened years after, as Orderic tells us, that Ilbert de Lacy reared his castle, and as travellers passed along that old highway over the ford, alongside that broken bridge, they shuddered as they saw in heaps the bones of those who died that day (Orderic Vitalis.) That castle that kept ward over that plain and bridge was not unlikely to obtain that name; still more so if, as is far from improbable, the De Lacys were of northern lineage, and could boast at least that on that day of death the Norsemen, not taken at a disadvantage, could and did hold their own.

Tedious I may have been, but interest—and that deep—I feel I have excited. It has been difficult to compress the numerous details of such a battle, and to work into a popular form, a Paper suited for such a meeting. The pains I have had to take, the authors I have had to consult, histories—ancient and modern, English and foreign—I have had to wade through and make extracts from, have been legion. No one but they who have tried it can tell what labour and thought it takes to re-write a page of history. I prove a negative, at any rate, by the impossibility of the distances of either Ricall or Tadcaster suiting in *any way* the fabled battle of *Stamford Bridge*, beyond York; and I strengthen my case by refusing to fall in with the historian of the Norman Conquest in his quiet statement that all authorities of any weight are in this particular instance to be overlooked, and treated as "mythical," because, if he is right, they must be wrong! I say that sort of writing may do for a periodical, but is unworthy of serious history. I, on the other hand, am accustomed to treat authorities with reverence and respect, and to ask myself whether it may not be that they are more likely to be right than myself, and to seek for a solution of the difficulty, not by stating their story is "mythical," but

by tracking out and believing what they say. I think I have, to-day at least, proved my point beyond all dispute, by evidence of every kind that could be brought to bear upon the subject. Each account we look into dovetails easily, and of course into its proper place: history—ancient and modern, nomenclature and topography, tradition and measurements of distance, French authors and Danish chronicle writers, the Sagas of the Norsemen, taken in their literal and honest meaning; and, not least, the *utter bewilderment* of those who take the contrary view. One and all lead to but one conclusion. — (*Freeman's Norman Conquest*, vol. iii., p. 354, note; 720, 723, 724.)

If I have "the audacity," or, as I call it, the manliness, to broach a new heresy, I am ever ready to back it up and do battle to the death for what I believe to be truth—not romance, but history; and trust that what was said of me by one of my reviewers, in sarcasm, you who know the localities will allow not to be far from true in fact, "that there is nothing Mr. Surtees has a mind to prove that he cannot find arguments to support."

ON THE STONE AVENUES OF CARNAC, AND OTHER PRE-HISTORIC MONUMENTS OF BRITTANY. BY REV. W. C. LUKIS, M.A., F.S.A, HON. MEMBER OF THE SOCIETE POLYMATHIQUE DU MORBIHAN, AND OF THE SOCIETE ARCHEOLOGIQUE DE NANTES, LOIRE INFERIEURE.

THE monuments described in this article belong to that section of the pre-historic age which has been designated the period of polished stone implements. Formerly they were supposed to be among the most ancient structures that told of the earliest inhabitants of this globe. But archæological researches have now shown that there was a more remote period of human history, in which man did not erect such

buildings, but took refuge in dens and caves of the earth, making them his abodes in life and his last resting-places in death. The cave-men, however, would seem to have been more advanced in the arts than those who planned and executed the grand avenues and other megalithic monuments of Brittany. The caves which they occupied have produced engravings and sculptures on stones, ivory, and reindeer bones, that are marvellous for accuracy of delineation and truthfulness of form, compared with which the carved stones of Brittany are rude and unmeaning. Some of these sculptures and engravings, preserved in public and private collections, are full of artistic life and vigour. Now it is said that there was a remoter period still of human existence, in which man simply chipped flints into rude implements and knew not how to polish them, nor did he know how to manufacture clay vessels and to procure fire. The antiquity of this people is supposed to be lost in the impenetrable mists of the post-glacial period.

Not for the archæologist alone, but for every sensible and intelligent person, these questions have a bright, an interesting, and instructive aspect. For although the ravages of time have greatly marred these venerable relics of antiquity, still we are able to recognize in them the arts of primitive peoples, and to call up before the mind's eye the very peoples themselves; to study their mental development, and to divine the uses many of their works were destined to serve. We are able in this manner to catch a glimpse of the private life, and even the religious ideas, of peoples of whose great antiquity we know absolutely nothing at present, because written history and tradition have not reached it.

There are few countries so rich in stone monuments of pre-historic times as that portion of Western France which was formerly known by the ancient name of Armorica, and now bears the name of Brittany. These monuments

are found in every part of it, but are more numerous on the lands bordering on the sea, where the exposed shores, poor soil, and dreary heaths, have not invited agricultural operations. In certain districts they are very remarkable, and in none more so than in the Department of the Morbihan, which is situated in the south of the Province between the Departments of Finistere and Ille et Vilaine. Here we find communes in which they exist at short intervals, in every variety of form, and of all dimensions, from the rude unhewn menhir or granite pillar, standing singly, to the wonderful groups of menhirs, arranged in lines or in circles; and from the simple rectangular cist of moderate proportions, to the huge and complicated sepulchre with its side chambers and ponderous capstones.

The menhirs, or pillars, are mysterious monuments, whose destination still remains, more or less, a problem. Some are supposed to have been erected as memorials of departed heroes; others as symbols of divinities; while others have been, perhaps, mere boundary stones; but no one has yet been able to suggest a reasonable and satisfactory theory for the vast avenues or lines of menhirs, which are more numerous, more remarkable, and more visited, in the Morbihan, than in other Departments of the Province.

Most persons have heard and read of the celebrated Lines of Carnac, but few, even of those who have visited them, have a clear notion of their plan. The prevailing idea is, that all these lines of granite pillars constitute one monument; whereas they form several groups of lines or avenues, separated and wholly distinct from one another. The number of lines in the several groups vary, and each group is separated by a void space of ground. Each group, therefore, constitutes a distinct monument.

I will now describe them, and then say what opinions have been put forth as to their destination.

Near the small town of Carnac, there is an eminence, partly natural, and partly artificial, which forms a huge long barrow. On the platform of its truncated summit stands a chapel, dedicated to St. Michael, and from this elevation an extensive view is obtained. Looking northwards you see vast heaths covering a slightly undulating country, fir plantations, and, here and there, small villages nestling among elm-trees. Turning to the west you catch a glimpse of the peninsula of Quiberon, celebrated for the ill-fated expedition of the emigrant royalists in 1795, which terminated in the atrocious murder of the prisoners. To the south are the blue waves of the Atlantic, with the islands of Belle-Ile, Houat, and Haedic resting on the horizon; and eastwards the eye travels across the peninsula of Locmariaker, rich in stone monuments of gigantic size, and perceives the great tumuli of Mané-er-H'roek, the Tumiac, and of the island of Gavr' Inis in the enclosed little sea or Morbihan.

Not far from the base of the north slope of the tumulus which now bears the name of Mount St. Michael, stand two of the three groups of lines which I propose to describe, stretching from left to right across the landscape,—the great army of stones, "silent witnesses of thousands of extinct generations," regarding which neither tradition nor history has preserved the slightest record. Although composed of hard granite, many of these stones have been gnawed by time, and too successfully assailed by the strong and destructive hand of man.

If you descend into the plain, and bend your steps to the village of Menec, which lies on the left hand, you find that several of the farm-houses and cottages, with their thrashing yards and gardens, are enclosed in a circle of upright stones, which is 277 feet in its largest diameter. This circle forms the western termination of a group of eleven lines of menhirs or pillars; and if you walk eastwards you at length arrive

at the other end of the group, at a distance of 3,076 feet from the village of Menec. In the course of your march, two or three facts present themselves to your notice. You perceive that the bulk and height of the menhirs diminish gradually (*i.e.*, from about nine feet down to three feet), and that the widths of the avenues also diminish; and that as you gain the further extremity of the lines the stones increase somewhat in dimensions, not, however, rivalling in grandeur those near the circle which you have left behind you. You notice another fact, that the eastern extremity, which may be said to be the commencement of the avenues, is on a comparatively low level, that the ground gradually rises westwards over an undulating country, and that the heads of the lines and the circle are on a more elevated plateau. These are features generally noticeable in the other groups of avenues.

Continuing your course eastwards, you traverse a space of 1,669 feet, and ascend to a plateau, on which you find the western extremity of another group of avenues, consisting of ten lines, commonly known as the menhirs of Kermario, taking their name from a farm-house close by. These stones form the termination of a grand series of greater length than the one you have just quitted. The blocks of granite are of colossal proportions (about twelve feet in height), but there is no terminating circle now existing. If you follow these lines, you cross a hill by a windmill, descend into a small dell, through which a slender rill trickles, and then ascend another hill, on the slope of which the avenues lose themselves at a distance of about 4,000 feet from the other extremity. Here the stones are generally of small dimensions, few exceeding three feet in height. As you emerge from a fir plantation, which clothes the eastern slope of this hill, you perceive, on the other side of a small valley and crowning the summit of the opposite hill, the standing stones

of a third group of avenues, bearing the name of Kerlescant. A portion of the terminating circle (about 300 feet in diameter) exists here, as at Menec, and the lines are thirteen in number, and extend for 925 feet; a very short distance as compared with the other two groups, but they are supposed to have extended to a greater distance in ancient times. In tracing these three groups, you have walked about two miles and a quarter.

There are other groups of menhirs, forming lines and avenues, in the parish of Carnac, as well as in some of the adjoining parishes, as, *e.g.*, at Crucuny, Plouharnel, Erdeven, Plouhinec, and Quiberon, all of which differ in the number of their lines, and in other particulars; and of these by far the most extensive may be seen at Erdeven, where the lines, ten in number, extend for about 7,000 feet. They are generally less known and frequented than those I have described.

From the description given above, the following may be taken as the general features of these great monuments:—

The lines do not lie strictly east and west, but vary a little to the north and south of these points.

Their commencement, which is the narrow end, is invariably eastward; and the head, or wide part, is towards the west, and on elevated ground.

The stones are always largest at the western termination, and of small size in the other direction. In the Menec and Erdeven groups, however, the stones slightly increase in size towards the commencement.

Where there are circles connected with the lines, they are always at the large end.

The circles are composed of stones differing in form from those of the lines. They are thin and wide, and not so tall as the tallest of the lines, averaging about five feet above ground.

The stones of the circles nearly touch each other, whereas those of the lines have spaces of from seven to twenty feet between them.

The average distance beween the lines at the west end is thirty feet; at the east end, eighteen feet.

It appears probable that the number of the lines in each series was determined at first, and the whole number begun at once. The size of the stones indicates this.

We may presume that they were begun at the west end, and probably in all cases the circles were added last, at least after the wider or west portion of the series had been erected, because at St. Pierre, Quiberon, the circle is seventy-seven yards on the south side of the lines; at Menec the centre of the circle is south of the direction of the central avenue; and at Kerlescant it is a large segment, and not a complete circle. In no case is there, strictly speaking, an attachment of the circle to the lines.

Now just as the same facts often produce opposite impressions on different minds, so is it with regard to these monuments. Archæologists and travellers appear to have viewed them through different coloured glasses, and have drawn strange and opposite conclusions from what they have seen. It is very difficult to banish from the mind pre-conceived and favourite ideas, and the glasses they have used have thrown such an agreeable colouring around the objects, that the opinions are adhered to in spite of their fancifulness and palpable falseness.

The peasant population, for many generations, have been looking at these lines through a highly-coloured glass; and if you ask them how these stones came to be thus arranged, they will tell you without hesitation, and expect you to believe, that these ponderous masses are the Pope's soldiers. They say that St. Cornely, Pope, and now patron saint of the parish church of Carnac, chased by an army of pagans, fled

pursued to the sea-shore. Finding no boat or means of escape, and on the point of being captured, he exercised his saintly power, and converted into granite pillars the soldiers who thought to seize him.

However absurd this idea may seem to us, it is quite equalled by that of a French engineer officer (Mons. de la Sauvagere) of the last century, who imagined that the Romans erected these lines for the purpose of protecting their tents from the fury of the tempest.

The hypothesis of our countryman who saw here a temple in the form of an enormous serpent, is not more satisfactory. Nor are the other opinions admissible which would make these stones memorials of the defeat of the Veneti by Cæsar; or a cemetery of the same people after a battle; or an enormous astronomical calendar; or a military trophy in honour of Hercules; or a grove of sacred oaks, and these great stones placed in lines like rows of trees.

My friend Canon Jackson suggests that a key, that may fit this "very rusty old lock" which so many have vainly essayed to open, may possibly be found in the account of the ancient chronicler, Geoffrey of Monmouth. According to Geoffrey, in the year of Our Lord 381 a large body of British soldiers passed over to Armorica under the command of Clemens Maximus, for the purpose of attacking and dethroning the Emperor Gratian. On the defeat of the emperor, Maximus resolved to establish his army as a colony in Brittany, instead of sending them back to England. Wishing to avoid all mixture with the Gauls, he sent over to England for wives for his soldiers and emigrants. Ursula, daughter of the prince of Cornwall, and eleven thousand ladies of the higher class, to say nothing of a much larger number of others of a lower class, embarked for Brittany. Contrary and stormy winds dispersed the fleet, most of the ships foundered, and nearly all the ladies perished (See *Notes and Queries* for July, 1869).

This story, whether true or not, is presented to archæologists, that they may manufacture it, if they can, into a key to Carnac. "Upon reading this event in the old British history," writes my learned friend, "and happening to recollect, first, the situation of Carnac, upon the very sea-coast of Armorica, and, next, the peculiar number of *eleven* rows of monumental stones, it struck me that the whole number of stones having been estimated by unprejudiced travellers to have been probably ten or twelve thousand, the original arrangement may have been designed to be a thousand in each row, making in all eleven thousand. The whole might thus be intended to be a great national memorial of the tragic end of the eleven thousand British ladies."

Unhappily for this ingenious theory, this key does not fit the rusty old lock at all. It is presumed that the Carnac lines are composed of eleven rows, but as I have shown that they are in reality *three* distinct monuments, one having eleven, another ten, and the third thirteen rows of stones, and that, besides these, there are five or six other monuments of a like nature, not one of which has eleven rows, I do not think the foundation a very good one whereon to erect such a theory.

There is no doubt that the number eleven has been assigned to these lines by careless observation, and once stated has been accepted unchallenged by succeeding writers. In the same way the three groups have been blended into *one* monument; for as it is usual for travellers to pass the short hour of their visit in examining the avenues of Menec only, they are not aware that a gap intervenes between each of the groups, and they take it for granted that the eleven lines of Menec are continued through the other groups as far as Kerlescant.

It is strange that the local archæologists have just as

imperfect an acquaintance with these monuments as we have in England, and not one, so far as I know, has made a serious study of them. The archæological society of the Department appear to have devoted their attention pretty exclusively to the sepulchral chambers, and to have overlooked these wonderful structures. Had they taken them into their serious consideration, and, as in duty bound and in the interests of science, under thêir protection, they could hardly have failed to raise a loud and indignant protest against the work of destruction that is going on every year, thereby rendering the problem of their construction and destination more and more difficult of solution. I have passed four successive summers in examining and planning them, and it has deeply pained me to mark in each year the vacant spaces which familiar friends used to occupy. I have called the attention of that society to the fact, and have likewise brought the matter to the notice of archæologists at the International Congress of Pre-historic Archæology, held at Norwich, in 1868. The Morbihan Society has slumbered over my complaint; but I am happy to say that at Norwich a committee composed of English and French members was at once nominated, to communicate with the Imperial Government, with a view to arrest the mischief if possible. I mention this here, as I do on all occasions, because I wish it to be widely known that structures which take the highest rank among the most curious and colossal monuments of the world are, even in these days when their study has become an European scientific movement, being demolished by man's hand and made more ruinous than the furious blasts of the mighty Atlantic and tens of centuries of winter rains had left them.

It may now be said to me, "You have told us what you suppose were not the uses of these remarkable monuments; surely after so long an examination and study of them as

you have made, you are prepared to tell us what you think these uses were." To you I must give the same reply as I have given to others. I am just beginning to learn the alphabet, therefore you cannot expect me to read the language before I have mastered the letters. It is a step in the right direction to have convinced myself that what has been supposed to be one monument, is in fact a number of separate and distinct monuments, each having its own features and peculiarities. There are more monuments of a like nature, with individual peculiarities, in Brittany, which are scarcely known. There are systems of avenues associated with circles in other countries, in Great Britain, in Lombardy, in Africa, as well as in India. Careful and accurate plans of all these should be made, and comparisons instituted between them, and researches prosecuted among them, and possibly their difficult language may in course of time be correctly interpreted. It seems to me that archæologists have all been too prone to dogmatize upon these monuments with an insufficient knowledge of their construction. You may yourselves read in publications of leading antiquarian societies in this country and in France, statements and opinions relative to Brittany monuments which are based upon false premises. Now in endeavouring to interpret the meaning of these celebrated Carnac lines regard must be had and attention given to two points, viz.: to groups of rows of pillars, and pillars arranged in circles, and to these two distinct features here brought into relationship with each other. Mr. Stuart, of Edinburgh, has expressed his opinion that circles of stone are not temples, but sepulchral enclosures. Up to this time, there is no evidence to show that the terminating circles of Menec and Kerlescant were used as burial places. It is true that in the summer of this year (1869) I found fragments of coarse clay vessels and flint scrapers and chippings within the area of the latter circle,

which had just been broken up for planting, but they were too few to afford ground for adopting his view. I have likewise found fragments of similar vessels and flint implements in the disturbed earth of the avenues; but there is no proof of careful interments, such as we observe in the Dolmens or sepulchral stone chambers. The soil in most parts is not more than six inches thick, and rests upon a bed of granite.

With regard to isolated menhirs there may be less difficulty in arriving at a safe conclusion. They are very frequently found associated with structures whose destination was strictly sepulchral. They may have been raised, therefore, to commemorate the death of those whose bodies rest in the tombs at their feet; or they may be symbols of presiding divinities watching over and sanctifying spots which the spirits of the dead may be supposed to haunt. At Locmariaker, the tombs are of such colossal proportions as to induce the belief that heroes of no common order died and were interred there. Accordingly we find menhirs of much larger dimensions than at Carnac, close to the sepulchres, and one menhir, in particular, of astonishing size, measuring 67 feet 6 inches in length. Circles also sometimes form part of sepulchral monuments. It is possible, therefore, that *groups of pillars arranged in lines and in circles, and associated together, may have served a purpose in some way connected with the funeral rites or solemnities that preceded interment.*

There is a feature which is common both to groups of rows of stones and to the sepulchres, which may help to throw some light on the subject, viz., their orientation. By far the larger number of the sepulchral monuments—those, I mean, which are usually termed Dolmens—have their openings or entrances between the east and south points of the compass, *i.e.*, nearly ninety per cent. are so turned, which it must be admitted cannot be an accidental circumstance. So,

too, the avenues are similarly orientated. If, therefore, the builders of the tombs had a religious reason for this arrangement, the same motive must have been dominant in the minds of the constructors of the avenues; and the inference is not without force that the same people erected both. This arrangement may be a token of their religious reverence for the deified orbs of heaven, the sun and the moon.

There are few circles not associated with avenues in the Morbihan. One exists in the Ile-aux-Moines, and a second on Ile-Lanic. The third, at St. Pierre, Quiberon, is not far from a group of avenues. Not one is in a perfect condition.

The first is of a crescent or horse-shoe form, and it has been questioned whether it was ever more than a segment of a circle. The distance between the two points of the crescent is 322 feet.

The second is upon a very small island close to Gavr' Inis, the island being only about 200 yards in diameter. On the south side the land slopes gently towards the sea, and on this slope lie the remains of a circle of 165 feet in diameter. Three only of the stones are standing, the others have fallen. The sea has encroached upon the island, and its stormy waves have carried away a portion of the circle, and continue to destroy both it and the island annually. When Sir Henry Dryden and I planned it in 1868, the tide happened to be low, and we had a good opportunity of observing some of the stones that had completed the circle lying on the beach and rocks, and resting not far from their original places. This is the only example with which I am acquainted in Brittany where the pre-historic people have left abundant traces of the unknown customs which they practised upon such spots, and I trust it will receive, as it deserves, a most careful examination with the spade from the proprietor. Not only is the area of the circle thickly strewn with

fragments of clay vessels, coarse and fine, ornamented and plain, and with animal bones, and stone implements of various kinds, such as chisels, scrapers, knives, and hammers, but the whole of the small island itself appears to be sown with these objects. While we were engaged in planning, I picked up several good specimens of them that were lying on the surface, or had been brought to light by the action of the waves.

The third is 195 feet in diameter, and has been deformed by the cultivators of the land, many of its stones having been displaced. I was informed this year (1869) that the proprietor or occupier intended removing what remains of this circle, because the stones interfere with his agricultural operations.

I know of one example only of a square of menhirs in Brittany, and this is in the Morbihan, on the borders of the parish of Erdeven, and not far from the gigantic Dolmen of Kerconno. The destination of this square I can simply guess at, and suppose that it served the same purpose as the circle.

There are a few stone circles in Yorkshire, on which I wish to make two or three observations. My attention was drawn to them very recently by reading in the newspaper an extract from Mr. Wardell's "Historical Notices of Ilkley, Rombald's Moor, and Baildon Common." His description is not quite accurate. From his account, I expected to find near the Horncliffe shooting-house, on Hawksworth Moor, a small circle of upright stones, enclosed in a second circle of stones set on edge, whereas I found a structure not closely answering this description. There are very few stones set on edge, and I think that originally very few, if any, of the others were so set, and there is no inner circle. There are a few small stones about a modern excavation in the centre, but they appear to have been thrown there at random. The

larger number of the encircling stones have the appearance of having been laid flat, one on the other, in the form of a wall. The stones are generally small (two to three feet in length), and the greatest diameter of the area, which is of irregular shape, is about thirty feet. The monument is called in the ordnance map "Druidical circle."

A second structure, resembling the former, marked on the map as "site of a tumulus," is at a few yards' distance south of the shooting-house on Burley Moor. Here more of the stones are set on edge, and outside of them is a bank of earth and stones, about five feet wide, against which they rest.

A third monument, described by Mr. Wardell, is at a distance of two-thirds of a mile west from this shooting-house; and is a small circle as compared with those I have described as existing in Brittany, the diameter being about forty-seven feet, and the highest stone three feet three inches above the ground. This structure is of a different character from the other two, and was probably destined to serve the same purposes, whatever they were, as those in Brittany. I should be inclined to look upon the two other circular inclosures as being the remains of dwellings, *i.e.*, of hut-circles.

ON THE BRIDLINGTON FLINT IMPLEMENTS. BY JOHN FFOOKS, ESQ.

In a Paper which I read before your Society in 1866, I described the discovery which I had made at Bridlington, that there are four distinct classes of flint implements in that immediate neighbourhood. I have this year collected more implements, that had been thrown up by recent ploughings on the same fields, and I am glad to find that they confirm my previous conclusions in every particular; and they have explained to me very important points relating to the mode of warfare in those early days, as well as illustrated the social

habits of the people who used them. In 1866, I was so careful not to mention anything that there could be a doubt about, that I left many things for future investigation which I had then obtained a glimpse of, but could not confidently describe. I now take this opportunity to relate to your Society the facts which have become known to me by a careful examination of a large number of each kind of implement and weapon; associated as they have always been, in my mind, with the manner in which they were left on the fields; and this Paper will complete the history of the flint implements of Bridlington so far as I have been able to ascertain.

The people who used flint implements as the hardest substance that they could form into a weapon, or a tool, must have been very primitive inhabitants. Men could only have used wood, and bone, or soft stone, before flint; they did not necessarily use flint before other kinds of stone, and very probably they did not do so, as I have found all their weapons and implements made of soft stones of various kinds, but the soft stone implements have suffered far more than the flint ones from the ruthless effect of civilization. The farmers dislike to see stones lying about their fields, because it disfigures their finished appearance. Though I believe small stones, in dry seasons, prevent the rays of the sun absorbing the moisture from the roots of the growing crop, and that they really are beneficial; but no distinction has been made even between large and small stones, and thus all have been picked up and carted away; and I have often seen valuable implements being ground to dust on the roads from this cause.

The white flint appears to have been first used at Bridlington, probably because it was the most easy to manage, and the implements could be made larger than in grey flint. Most of the commonest implements may be found there

made of this flint, but it is very difficult to get them moderately well chipped. They appear generally to have been roughly broken into shape, as a mere novice would make them, and a collector will immediately discover that, if he is fastidious regarding the workmanship, he cannot find a specimen to please himself; but no archæologist would confine himself to beautiful forms, if he wishes to appreciate the evidence of flint implements.

The art of chipping was strictly progressive, as well as all other arts have been, commencing very rough and ill-formed, and finishing beautifully even and regular; and if we carefully examine the improvement in the method of manufacturing the implements that are left, and consider the many useful purposes for which they were adapted, we shall discover that there is abundance of proof that the three first tribes who inhabited Bridlington considerably advanced in civilization. I believe there is no doubt that they each manufactured their own implements, as I do not find the same pattern exactly followed in many instances; and those who understood the art of chipping flint sufficiently well to form perfect implements, were either not inclined to take the trouble to make them all well, or they found that for ordinary purposes it was not necessary to do so, for I have found at least fifty inferior implements to one superior, even of grey and red-coloured flint; and I wish everyone to understand that the people who used flint implements were contented with very inferior chipping to what they find in my collection, and probably in any other.

Whilst I was in the act of collecting them, I indulged freely my own speculations regarding the kind of lives these early people must have led. I have since gone amongst our own poor, and observed how they live. I have also partaken of the comforts of a log cabin, in the far West of America, and witnessed the contentment and rude happiness of settlers

in the newly-reclaimed wilderness; and I have lived in the woods, far away from the sound of the busy world, and have seen the Red Indian in his wild abode: and after this experience, when I have gathered up the flint relics of the people who lived at Bridlington at least three thousand years ago, with nothing around them but a population of uncultivated people, such as may be met with along the frontiers of any newly-settled country, I have not been inclined to despise them, on the contrary, I know they may have been far less vicious than the pioneers of our modern civilized community; and it is not probable that they had any spirituous liquor to madden their intellect, and spread desolation among their people. I know they were in the most primitive condition; that their wants were few, and easily supplied. They built their log hut, which was their home. The land was all open to them to be cultivated, and well covered with wild animals. It only required the ingenuity to invent or form hooks, spears, and arrows, and tools to prepare the surface of the soil, and they could insure abundance of food; and in the most primitive condition this was the *sine quâ non* of existence. Now, these relics show that they were capable of inventing or imitating these things for their use, and of accumulating inventions, and becoming thereby more masters of creation, and improved in their social condition. Their conventionalities restrained them, and were enforced without a doubt in the same manner as the native Americans and the Maories regulate their society. Their instincts were the same, and they reasoned as men. From this starting-point we may trace the evidence of their improvement by the implements they have left on the fields; in the remains of their homes; by their fortifications and enclosures for their cattle; their stone circles for religious purposes; as well as their tumuli, cromlechs, and memorial pillars; but I have to confine myself to their flint implements.

At first, their chief weapons were a stone, which they threw; and a stick, which they fashioned into a club to strike with. Now it is remarkable that from these roots I have been able to trace a connecting link with the weapons of flint which are found at Bridlington; and it is chiefly to illustrate this fact that I have written this Paper, as it stamps the implements which are found there as the very earliest that can exist upon this island.

The sling-stone is familiar to every one; but we should not omit to remark, that when we compare the feeble force of a stone thrown from the hand, and the short distance it can be sent, with the power and distance which a stone can be hurled from a sling, the invention of the sling in the first ages of man was quite as important as the modern improvement of the rifle compared to the old flint gun, to this generation.

It is impossible to decide when the sling was invented, but we know it was used at a very early period in the East, and might have been brought to this island by the first emigrants. I find, however, that they did not confine themselves to the sling, as I have picked up very large stones which were undoubtedly used as weapons; too large and too rough for throwing from a sling, although they were used by the same persons who used sling-stones, as both kinds were left together, with other weapons, on the ground where they had been fighting.

The variety of patterns of sling-stones is very great, and represent the ingenuity and taste of the inventors. There are different sizes of circular balls of flint, and circles of flat flint, or flat on one side and elevated nearly to a point on the other; square flints of different sizes, with flat and uneven surfaces; and triangles of the same kind; and ovals, more

or less exactly chipped into form, and discs; and oblong pieces with flat or pointed ends, and some with several sharp projecting pointed edges, others with only one pointed end, nearly resembling the dart and the spear head.

The other primitive weapon was the stick, of any size. A mere straight stick would inflict punishment, but not be a very deadly weapon; but when the root was fashioned into a knob at the end of the stick, it became a more dangerous weapon, from its concentrated weight increasing the velocity and effect of a blow. The ingenuity of these people added to the power of this weapon, by substituting a knob of flint, which they fastened on by a thong of raw hide, that became tight and firm when it dried and contracted. This was, undoubtedly, a most formidable weapon, and the proof we have of how much they valued it for fighting is, that nearly every set of weapons left on the fields have one or more of these stone knobs among them. They were formed of various shapes, which gives them additional interest. The first which would suggest itself, is simply round, chipped over the surface, to admit the tightening of the thong which fastened it on to the stick.* A short neck was added, the size of the stick, to which it was fastened. At this point, a singular development of the form of the knob is presented to us. Some ingenious observer of natural objects must have remarked how easy it would be to convert the knob into an imitation of the head of a bird, by merely leaving a projecting point on one side; and having advanced so far, the bird's head, and the snake's head, became a prolific subject of imitation, but as the bird's beak is only slightly developed in a projecting point from a round knob, I do not think I should have detected the intention, if it had not been more fully expressed in other weapons, which in the most perfect

* It is presumed that a cup was formed in the natural knob, to receive the stone knob, or it could not have been tightly fixed.

specimens that I have found is nearly a fac-simile of a bird's beak, with a slight comb, and the head of a snake.

BIRD'S-BEAK AND SNAKE'S-HEAD FLINT WEAPONS.

A bird's-beak or snake's-head flint weapon, with numerous modifications, became a distinct weapon, which nearly every man appears to have carried in addition to his sling-stones. But very few persons were capable of chipping the imitation of a bird's head or snake's head out of a flint core accurately, and this pattern is consequently very scarce. The most common modification was a simple open triangle, or one angle of an open, square piece of flat flint, with the end that was intended to be attached to the handle left rough, the other end either pointed or left blunt, or squared. They also inserted a simple beak into a knobbed stick, which made the most formidable weapon. The beak was one or two inches long, thin, narrow, and sharp at the point, and excellent chipping is shown in this description of beak; on this account I consider it one of the latest improvements. I look upon this weapon as the best substitute for the sword which the aboriginal people possessed. The stone knob was heavy enough to kill with a single blow on the head, and the beak would inflict a deadly wound if it penetrated the skull or the breast.

SPEARS.

The spear is so well known which is made of steel that we are naturally inclined to presume it was one of the most common and effective weapons that the ancient Britons possessed; but I find this is far from having been the case. Its origin was, no doubt, a pointed shaft of wood, which subsequently was made a more dangerous weapon by substituting a point of flint, in precisely the same form as the arrow. But the first three tribes who inhabited the neighbourhood of Bridlington were by no means satisfied with the

mere point of flint, as I have found forty varieties of form, and many of them differing so widely that they may be called distinct weapons of the same class. The sharp point was the most general form, but some of them were made round at the point, or quite blunt, as if the mere force of the arm was relied upon to inflict a deadly wound. I have only found two varieties that have sharpened edges that would cut their way into the flesh. One form invented is clearly the original of the halbert of the feudal ages. It has a point and a projection on one side, which is a broad, sharp edge, to strike with, and being struck off a large core of flint, its weight would add considerably to the effect of a blow which might be given with it. The great number of different forms of the spear, as of every other kind of weapon, is a proof that each person made his own implements, and that the early Britons were exceedingly earnest and intent upon inventing new and effective weapons, and that they fully expected to bring the spear to such perfection as to take the place of some other weapon; but in this they failed, as it required the knowledge of metal to be accomplished, while the inferior workmanship exhibited in nearly all the specimens is a proof of the very early period of their manufacture, and as there are none better formed than those which I have found, within the district, the successors of the first tribes could not have used spears that were chipped in a different manner. Yet perfectly different specimens are found within three miles of their settlement, as I mentioned in my last Paper.

I have good reason to believe that spears were not more commonly used in war than arrows, and that neither of them were considered very efficient weapons for fighting with; still there is no doubt they were preferred by a few, who were probably dexterous in their use by constant practice, as they are both occasionally found among the relics of war;

but where there is one spear or arrow-head found, there is certainly a hundred beaks or knobs.

HAND-FIGHTING STONES.

Another weapon, which is not generally known, was pointed out to me by Mr. Edward Tindall, of Bridlington. It was used for holding in the hand to strike with. The one he showed to me was a native flint, with a long projecting point and an uneven head, which the fingers could fit over to tighten the grasp.

I have since found many different varieties of these fighting stones, cut expressly for the purpose—round ones with a pointed end; and flat flints, pointed; and others with a jagged edge; and long, round pieces of flint, pointed at one end; and some very rough nodules of flint, with the natural projections pointed. This weapon was in much esteem, I have no doubt, as it is constantly found with other weapons.*

HATCHETS.

Flint hatchets were very commonly used as weapons, when they were made small for the purpose; but I have never found large hatchets where there had been fighting, and the small hatchets are not carefully sharpened, so that it appears with this weapon, as with others which I have mentioned, the ancient Britons trusted more to the force of their blow upon the bare head, than to the keenness of the cutting edge.

THE DAGGER.

The dagger appears to have been a well-known weapon; but I should judge that it was a late invention, as those which I have found are exceedingly well cut—some about

* A bas-relief in Athens represents a fight with the Amazons, with hand-stones; and on Trajan's column, at Rome, the Roman Legions are represented as attacking an enemy who are defending themselves with hand-stones.

two inches long—are very thin, and sharp-edged. They were no doubt fastened to a bone blade and handle, in the same manner as the bronze blades that have been found in the tumuli indicate that they were made.

I have a flint knife that appears to have been fastened to a handle in the same manner, which leads me to suppose that the dagger is the offshoot from the knife, and that such knives were used as daggers.

The dagger is the only weapon that appears to have been intended by those early Britons for striking below the head, and we must conclude from this circumstance that their mode of fighting was always overhanded, and that they were unacquainted with any method of attack which was similar to our bayonet charge. They appear to me to have trusted to a hand-to-hand encounter, with their blunt spears, their small hatchets, their tomahawks, their knob-sticks, and bird's beaks, and hand-fighting stones, and to have reserved their sling-stones for pursuit. They never carried more than four kinds of weapons to fight with; and those who were the best provided with weapons I have found possessed a bird's beak, two small knobs, three or four sling-stones, and a hand-fighting stone; or varied in this way—a spear, an arrow, a knob-stick, and sling-stones.

A flint knob, or a bird's beak, or snake's head, and sling-stones, are almost invariably found with dress-fastenings, while the other weapons vary very much, according to the inferiority or apparent superiority of the person who possessed them. Some of the sets of weapons show that the person was provided with the best manufactured weapons that were made; others appear second-rate, but still good; while others appear not to have possessed any good weapons whatever; and the dress-fastenings which are found with them invariably correspond with the quality of the weapons that lay near them. So much is this the case that I have felt as

I picked them up that I must renounce my right of reflection before I could refuse to recognise the fact.

THE DART.

The dart is a very peculiar weapon, which I do not comprehend the use of. There are at least four different shapes. One of them is a mere triangular point of flint, varying from an inch to an inch and a half long; another two inches long and pointed at both ends, but one end is twice as long as the other, and as sharp as possible; the third, which I have in soft stone, was made flat on the under side, and triangular on the upper, with the front, or long end, pointed, and the other end contracted nearly to a point. I have the same shape in flint, much larger. These darts were generally made with very little attention to accuracy of shape, and some of them are exceedingly rough weapons. The fourth kind of dart was certainly intended to be thrown from the person in some manner, as it has been found in the skull of a buried warrior in a tumulus. It is the form of a leaf, thin, and sharp at the front edges.

I think it will strike those who hear this Paper read, that there is a peculiar originality and primitive simplicity in the weapons I have found, which were the only kind that the earliest people who inhabited the neighbourhood of Bridlington were acquainted with. I do not know that the inventions made any progress there; but it is evident that wherever the knowledge of such weapons was derived from, none could have been of earlier date in this new world. They consist of a mere stick and a stone, made effective and dangerous weapons by subsequent alterations and additions; and by the time these were improved to the utmost extent of their ingenuity, the inhabitants had learned to cut flint much more dexterously than they could at first; but when the straight method of chipping was only understood, the

Romans had not invaded Britain, nor had the people who introduced metal into this island arrived on this shore; and if there could have been a doubt of the reality of the tools (which I described to you in my former Paper) having been used by a people who lived before metal had been introduced, the primitive character of the weapons which I have since found removes every doubt of the fact, and I now expect that I shall be believed to have found distinct evidence of three tribes who inhabited Bridlington at an age at least as early as the erection of the stone circles and avenues at Avebury, and before the existence of Stonehenge.

HOUSEHOLD IMPLEMENTS.

From the evidence of the caves and the drift, flint knives may be considered to be the invention of our antediluvian forefathers; we cannot, therefore, feel surprised that wherever the descendants of Noah have existed in this new world, we find a great number of knives: but those which I have seen of antediluvian type may be classed under the head of flakes.

The aborigines at Bridlington exerted their inventive or imitative genius quite as much in these useful household implements, as they did in their weapons. I have found ten distinct patterns of knives there, including flakes, made of various sizes, for different purposes; some several inches long, and strong enough to divide the joints, or strip off the skin of an animal; and others exceedingly small, as if they could be of no service but for a woman to sever her thread with, as a substitute for scissors. Several of the blades of these knives do not materially differ, except in length, from those which are still made in steel. Some have a neck formed at the end of the blade, to tie a loose thong of leather round, to suspend to a girdle, to prevent their being lost. Even those which are known as flakes, because they are thin and were evidently struck off a core at one blow, were first intentionally

formed so that they would be suitable for knives by having slices cut triangularly off the upper side, to produce two cutting edges. We can easily imagine how useful these flint knives were to those early people, when we consider the various purposes for which we employ steel knives at the present time, for although they were incalculably inferior to sharp steel, yet to them they must have been a substitute for many tools which have been since invented.

Scrapers may be classed next to knives as the most useful and common implements which the aboriginal inhabitants of Bridlington employed for various purposes. They are both numerous and of a variety of sizes and shapes.

We may probably assign the first use of them to have been to clean raw skins, and to prepare them for clothing, as curriers do at the present time. They were also adapted for splitting willows, and for stripping off the bark, and cleaning them for wicker-work; and I am led to believe they were used for this purpose, from my having found a large size, and a very small size, in considerable numbers with wicker-workers' tools.

The thumb flint is a variety of scraper, as the modifications of its form is sufficient to prove. Some are quite round, others have a projecting side to fit the point of the thumb, and extends nearly its length, to give more resistance.

The most important use to which the scraper has ever been employed is, for giving an even, smooth surface to flat boards. To accomplish this, the aboriginal people invented a plane of flint, which was fixed to the front of a frame of wood; but this has since been changed by the modern application of the scraper, which is passed through a flat wooden frame, and fixed by a wedge. The original flint plane was made flat on the under surface, and elevated, more or less, on the upper, and formed straight on one side and obliquely on the other that it might scrape or cut as it was

forced forward. The cutting edge of the plane was formed by the sharp angle of the upper and under surfaces, which severed the rough surface of the wood by its oblique motion.

It is obvious that the ancient Britons could not get over the obstruction of constant fracture in a straight thin flint edge if forced forward over a rough surface; and, therefore, they adopted the angular oblique edge, which overcame the difficulty. I do not imagine that this implement could have been so efficient as the modern application of the square scraper; but it is evident that we are indebted entirely to the power of resistance of steel for the efficient work performed by the modern plane, and in point of scientific arrangement the oblique angular edge was not less ingenious than the subsequent application of the scraper, and the principle involved is the same in both implements.

CLOTHING.

It has been ascertained that a coarse texture of flaxen cloth had been fabricated at a very early period, and before the sheep had been imported into Britain; but the skin of the wolf was still worn by the people, with its warm fur next to their skin, to shield them from the inclement climate; and if skin clothing was commonly worn, it would be surprising if we could only find the implements with which the raw skin of the wild animals were prepared for use. I have found amongst the flint relics at Bridlington two sets of implements, that appear to me to have been employed in the manufacture of skin clothing. One of these is a variety of sharp-pointed flints, which I consider were used for making small holes in the skins, to pass a thread of some kind through, to fasten the skins and different parts of the garments together. The other implements were apparently formed to press the seams after they were sewn, and I have

found these two kinds of implements together, as if they had been used by the same person.

The sharp points are in some instances nothing more than carefully cut points of flint, about an inch long; others are short points projecting from pieces of flint of no definite form, whilst others are projecting points from the centre, or at one angle of a square piece of flint; but all indicate by their form that the point has been the only object for which these implements were made, and as it would require such a point to make holes in skins to pass a thread of any kind through them, I think the most natural use for which these points could have been applied is the one that I have assigned.

The seam pressers are made in a very definite shape. They are all flat pieces of flint on the under surface, and rounded on the upper; and there is a handle to most of them, which is formed by chipping the flint away, to leave a neck, dividing the handle from the body of the tool. I have a great many specimens of them, with very little variation of form.

FISHING.

The fish that abounded in Bridlington Bay must always have been a good source of supply of food for the inhabitants, and it is natural that various means should have been adopted for catching them. I have found many fishing-hooks of different sizes, but the shape of them is not exactly similar: some are very rough specimens, but when covered by a bait they were probably found efficient for the purpose; others are carefully cut, and appear to be as well adapted for holding large fish as any that are manufactured of fine steel. Great skill in the art of chipping flint into form is exhibited in the curved and rounded hooks, but to avoid the difficulty that most persons must have experienced to produce a perfect shape, a method of cutting the flint at first flat, and then

chipping out the hollow for the hook was adopted, which answered equally well for catching some kinds of fish; but to land the great sturgeon, cod-fish, and ling, must have required the best flint implement they could manufacture.

I have found also a great many spear-points, of a peculiar shape, that appear more appropriate for spearing fish than for the purpose of war, and I have little doubt that the fishermen in those days resorted to this means of securing some of the flat fish that lay on the sand, and those which will not take bait on a hook.

Added to these two methods of catching fish, there is little doubt that they made nets.

TOOLS.

In describing the different sets of tools which were used for various purposes, in my last Paper, I did not explain the variations of form which those tools had undergone during the period that the first tribes were inhabiting Bridlington; but I should not convey a correct idea of the active state of their minds in that very early age, and how much we inherit from them, if I left this untouched.

Amongst some of the best known implements in museums are the soft stone hatchets, which, from their size and excellent shape and finished form, have always been preserved by the ploughmen, and appreciated by the public. Real stone hatchets of this kind are, some of them, beautifully formed and finished, but they are all of them of a much later date than the flint implements which are found at Bridlington, as they did not exist before the grinding stone had been invented, as their surface bears sufficient evidence.

I have found a very ancient hatchet, that discloses its age by its form as well as its finish; it is quite distinct from those which are found outside the boundary of my search, from being made sharp-edged at the side, instead of at the end; and it is slightly curved at one end of the cutting edge.

Hatchets made of flint are very various in shape and size. I have already mentioned a small-sized hatchet which was used in fighting; there are other small hatchets which were evidently made for cutting off small willow sticks for wicker-work, and a specially small kind, carefully made, which appears to have been intended to sever the ends of the willows after the basket, or other object of their art, was put together; the cutting edge of these is not more than an inch wide. Some hatchets are large sized and nearer our modern shape, sharp at the edge, and heavy enough to cut off a large piece of wood.

The hatchet which I found with the carpenter's tools is a thin flake, chipped over the upper side, and sharpened at the edge, with a shank formed by cutting out a right angle with the blade to fasten the handle on to. Another kind of hatchet is similar to a wedge, which probably was the origin of the invention, as flint readily splits into the form of a wedge, with an exceedingly sharp cutting edge.

CHISELS.

The primitive shape of the chisel was very different to the form that was afterwards employed. I described one that I found partly rubbed down to sharpen the edge, and cut an exact chisel shape, as we now see chisels made of iron which are used by stone masons; but at the earliest period, when flint was the material of which they were made, they were only intended to chip wood with.

The first shape of the chisel was, undoubtedly, a rather long wedge. This form was varied by cutting two slices of flint off a core, in a slightly triangular pointed form, and then severing the chisel complete from the block, which left a broad head to strike upon, and a sharp edge, an inch wide, to chip with. This kind is found of various sizes.

I have found numerous small chisels, an inch to an inch

and a half long, cut moderately thin, carefully chipped into shape; they are miniatures of the long chisel, and appear to have been fitted into handles. This pattern was made longer, to hold in the hand without a handle, when the head was rounded; but before the true flat-sided chisel pattern was adopted, it was the custom to cut the whole length on one side nearly flat, and the other angular.

I have likewise some chisels three inches long, formed by being chipped off on both sides to form the edge, which is about an inch wide, with flat heads, but by no means carefully made.

In after ages, stone chisels went through various modifications, and all of them were ground down to a cutting edge, instead of being chipped. They then made some of an oval form, gradually reduced in size towards the striking end; while they made others long and narrow, and of an uniform width throughout, with triangular slices cut off their face.

Others were nearly flat, with rounded sides, and contracted throughout their length nearly to a point. Chisels of this description must have been continued in use down to the introduction of steel, and probably later, but none of them are found in the immediate neighbourhood of Bridlington.

There was another kind of chisel in very early use among the ancient inhabitants, made expressly for cutting out hollow surfaces, such as bowls, from solid pieces of wood. I have found them made of a curved piece of flint with a flat head and a sharp edge; and, likewise, made of a straight piece of flint chipped off at an acute angle at the back of the implement, with a pointed head to fit into a handle; and another, hollowed in a gouge shape, with a point to fit into a handle.

DRILLS.

The drill appears to me to have been gradually developed, until it assumed the form of the auger. It must have

originated in a sharp, long point of flint, of which I have found numerous examples. Then sharp edges were found of great importance, and they were formed by angular sharp sides being chipped the whole length of the long point of flint.

Another very distinct shape was given by chipping notches out on both sides of a round point of flat flint, to form a separate head, and bevelling both sides of this head in opposite directions.

Others are formed of a triangular sharp point, with another point at the reverse end to fit into a handle; and I have found natural flint screws sharpened to form drills, and others chipped crossway to make the screw.

Long points of flint, chipped carefully into form, were very much used, probably for cutting out holes that were too large to be drilled out, for mortising, or for punching out old wooden pegs.

I have a great many other tools, of peculiarly good form, but they are not represented by modern tools made of metal, and the use of them is consequently unknown; they were probably only useful during the period that flint was the hardest substance employed for mechanical instruments, and to persons in their primitive condition; but, notwithstanding our ignorance of their intention, the fact that they exist with so many which we do know the use of, conveys a most convincing proof that the people who made them and used them were active, intelligent, and persevering, and continually improving their resources and condition of life, and though their power of applying their genius was limited, from not having discovered the method of using metal, still whilst flint was in fashion, it was no doubt sufficient for their requirements; and we may conclude that the range of their invention was more strictly confined by their moderate desires, and the number of their population, than by the

degree of refinement which they had attained; for how can we call a people destitute of refinement, and of the comforts and conveniences of life, who joined in communities, and built their huts in the regular order of streets? who were acquainted with the uses of fire, which we know by their having made bread, and why should we suppose that their cooking was confined to this act alone? and who manufactured such a variety of weapons, both for the defence of what they considered their wealth, and to provide themselves with the best means to gratify their appetite for a variety of food—arrows for birds and the smaller game, darts and slingstones for the larger animals, and hooks and spears for catching fish, and from the skins of animals fabricated clothing of the most comfortable description?

We may not be able to state the degree of refinement of their manners, nor describe their institutions of government, but we certainly can conjecture, from the nature of the relics they have left, of substantial, and even gigantic proportions, as well as minute flint implements, that they were no mean savages destitute of reason and depending upon their instincts for subsistence. What can be more characteristic of comfort, and a certain degree of refinement, than the knowledge of manufacturing wicker-work? and so excellently finished that the polite Romans, when they came as conquerors to the island, coveted the possession of their works of art and sent them to their Imperial city. And of what use would such tools as the flint saw, the chisel, the drill, the hatchet, the hammer, and the plane, have been to them if they had been mere savages? Depend upon it these were not playthings, or inventions of fancy, which wiser men than they have converted into useful implements. They are surviving records of the personal vigour and intelligent action of a people who possessed determination to promote their own happiness by the advancement of science and art.

And if their mechanical tools and farming implements are indications of their assiduous labour, are they not a direct proof that their line of improvement was in the same direction which their successors advanced, and which we are following at the present time? But probably the evidence of their appreciation of personal ornaments, which were elegant in design, assisted by a variation of colour and careful execution, although they were merely made of flint, is the strongest proof that they had attained a degree of social improvement which placed all human happiness within their reach; for illiterate savages are not manufacturers of works of art, but for ever remain content with natural productions to decorate their persons, and no people would commence with the beautiful and ascend to the useful arts, but, on the contrary, their first attention would be turned to the means of existence, and be followed by the gratification of taste.

DRESS ORNAMENTS.

I described the existence of dress-fastenings in my last Paper, but I went no farther at that time, because my collection of ornaments was by no means perfect. I have been fortunate in finding many more relics of this kind during this season. They consist of the dress-fastenings of various kinds, and of several patterns of brooches and breast-pins, and larger forms of worked flints, which were worn as ornaments. One of the commonest patterns of brooches is formed of a piece of flint, straight across the upper part, from two to three inches long, with a pointed or round projection nearly in the centre below, leaving the two ends extended for fastening to the dress; one of these ends being slightly pointed and longer than the other. There are large and small sizes of this pattern.

Another represents an obtuse angle of flint, half an inch wide, and a variety of other sizes.

Others are circular and triangular flints, which were set in some other substance, probably bone; and some have three, and some four equal projections from the centre.

Others form a large angular point of flint, with a lesser projecting point above it, and others are cut the ordinary lozenge shape.

A very pretty pattern has a curved neck, with a larger triangular-pointed head, which in the most perfect specimen represents a snake's head, very distinctly cut, but the workmanship degenerates in the ordinary examples into a mere curved piece of flint, with a small projecting shank for the neck.

There are also straight patterns of flint brooches, chipped out at equal distances, to make the line irregular, and some are cut in the form of a prism, and others are curved throughout the whole length, and straight pieces are left larger in the centre than at the extremities.

Dress pins are cut various lengths, either straight or curved at the upper end, while some have a knob rudely formed. There are two patterns that were much admired, if I may judge from their frequent use, one of them was a short pin, with a flat head, cut round, an inch in diameter. The other is a straight pin, with a cross head, of larger size.

The brooches and pins are almost entirely cut out of grey flint, which illustrates my idea that the people who used the grey flint were the same race of people who have shown such artistic skill in France, Italy, and Greece, from the earliest ages. That they were a distinct race of men, I have shown by their always having made their implements of this flint, and of a smaller size, compared with the red and the white, and invariably neater, and exhibiting great taste in the execution; at the same time expressing feebleness and a want of physical power, which the red flint implements so strongly develop. In expressing myself thus, I am follow-

ing my observation, that physical power and the energy of a strong will are always made evident in the grosser forms of whatever implements are invented and used by a people, and that taste and ingenuity and patient painstaking labour is characteristic of a more effeminate and delicate organization; and that this difference of character has been distinctly developed in the races who have taken the lead in the world.

It would occupy too much time and space to enter into the details of this subject in this Paper, but I may mention the striking difference of features which identify two such races of people who have always inhabited Europe, and who have been separated as much by their natural peculiarities as by the boundary lines of their territory.

Herodotus gives us the names of two distinct divisions of people, but we cannot positively separate them by the light of his description. He says, "The Celts are beyond the pillars of Hercules, bordering on the territories of the Cynesians," and "inhabit the remotest parts of Europe, towards the west," and that "the Ister (Danube) has its source in their territory." We can only understand by this description, that the Celts were the people who dwelt close to the northern boundary of France in his day, and this people was known afterwards to the Romans as the Germans. They are, and always have been, a fair-complexioned, light-haired, robust family, and they claim to have possessed that territory from the remotest ages. The Cynesians were, in the life-time of Herodotus, the inhabitants of France, but what race they were we can only conjecture, though the conjecture may be based upon very striking facts. France was named Gaul by the Romans, because the Gauls possessed it, and this is nearly all we know from that source about them; but we must remember the ancient authors did not attend to the previous history of other people, particularly if they were their rivals.

Strabo, however, assists us by a word: he says, in describing the Britons, that "their stature was taller than the Gauls, and their hair less red." Now we cannot believe that the people who inhabited France were red-haired from all time, seeing as we do that they have since become black-haired, and the size of these two races are in every respect the antipodes of the other. Mr. Greenwell adds a link to this chain, by having found a plaited tress of hair in a vase buried in a tumulus at Pickering, which was auburn, or more German than the red. Now the Gauls can be traced from India to England, and the Calmucks are said to be red-haired men to this day. They were conquerors, who overran Asia and Europe, and settled in France, because the land extended no farther, but they were not the Cynesians. There has always been the race of people in Europe who have the distinguishing characteristic of a clear white complexion and jet black hair, rather small in stature, with slight muscular development; and the people with this coloured hair is still prevailing in France, Italy, and Greece. How can we account for this, unless it is the consequence of the black-haired race having been the aboriginal people who occupied that territory, as the light-haired people occupied Germany, and that their conquerors did not bring wives with them, but from preference took the black-haired women they found in the country, as the red-haired men have always done since the days of Acis and Galatea, and in a few generations the original stock prevailed? This has been the fate of invading armies in general, where they have not expelled the first inhabitants. And what has been the case in the British Islands? There are well-known black-haired and red-haired races in England, Wales, and Scotland, who are supposed to have been driven to the extremities of the island by the conquering German and Scandinavian races, who were light-haired or brown. Those who were expelled from the interior

were the descendants of the original black-haired and red-haired races, and those who inhabit their territory now are the light-haired races (speaking only with reference to the prevailing colours). The blending of these clearly distinguishable races has created much diversity of colour in the hair, but the broad fact remains; and if we look back to the earliest period, before any intermarriage had produced the variations which now prevail, it is easy to comprehend that where the light and black-haired races were following each other, and settling side by side,—as they clearly did at Bridlington, when flint was the only substance which was known for making the implements they used,—their habits and their tastes were different, as they ever have been on the Continent, where they came from; and from this cause we find distinct classes of flint implements where they lived.

At the conclusion of the Meeting, the members of the Society and the *elité* of the neighbourhood were sumptuously entertained at a banquet, given at the Red Lion Hotel, by the Mayor and Corporation of Pontefract, and at which about eighty ladies and gentlemen sat down. His Worship presiding.

PROCEEDINGS

OF THE

GEOLOGICAL AND POLYTECHNIC SOCIETY

Of the West Riding of Yorkshire,

AT THE SEVENTY-FIFTH MEETING, HELD IN THE CUTLERS' HALL, SHEFFIELD, ON FRIDAY, APRIL 29TH, 1870.

THE RIGHT HON. LORD WHARNCLIFFE, VICE-PRESIDENT, IN THE CHAIR.

HIS LORDSHIP, in opening the proceedings, said: I wish I could say ladies and gentlemen, but as there is only one lady here I must say lady and gentlemen. I am sorry to find that, owing to the weather, there is so scanty an attendance to-day to listen to the papers which are about to be read. I am also sorry to inform you that one paper, written by the Rev. D. H. Haigh, "On the Runic Inscriptions of Northumbria," has not been received, and, therefore, that will be omitted from the programme of the day. I will now, imitating the example of my predecessors on similar occasions, proceed to offer you a few remarks on the Society, its objects, and what it has accomplished. First of all, then, as I understand, it was founded by a number of coal proprietors in the Riding who thought it was high time that the geological formation of the Riding should be more accurately investigated and known, and the various information derived from such an investigation used for the purpose of the advancement of

science, and for the benefit of the Riding generally. They at the same time thought it desirable to collect and record all such facts as related not only to geology, but to the operations of mining engineering, and archæological points of interest in the Riding. It has now for thirty-seven years held its meetings in the principal towns, and published volumes of its proceedings; and amongst many other important acts of the Society has been that of providing a home for interesting specimens of organic remains found in the geological strata of the Riding. It has also prepared, and I believe is always ready to exhibit, maps, plans, and sections of the various coalfields there are in the Riding, and models of the various engineering apparatus which have been invented at various times. These, therefore, constitute the peculiar claims which the Society has upon the Riding, as showing the interest which it has taken in its welfare. Of course, it is very desirable, in order to keep up the income of the Society and the interest among all classes of the Riding, that the number of its members should certainly be kept up, if not extended; hence one of the objects of to-day is not only to re-appoint the Council for the administration of the affairs of the Society during the present year, but to elect some new members about to be proposed. As regards the papers that have to be dealt with, the first is by Mr. Mackintosh, the title of which, shortly, is, "The Accumulation of the Drift in the West Riding." I understand that this is supposed to be one of the most important topics that can possibly be brought before the notice of the scientific portion of the inhabitants of the Riding, as it is mainly owing to a proper knowledge of such strata that we may hope to construct any great public works, such as railways and canals, without launching into an expense which might have been saved had that knowledge been first obtained. I have been told by men of authority and experience that vast amounts of money have been lost in

the construction of public works in consequence of their being undertaken without an adequate knowledge of geological researches before the works were actually begun. They have gone through strata which never ought to have been penetrated, and unfortunately missed other portions of the country where they might have constructed such large works at far less expense and with much greater rapidity of execution. It is evident, therefore, that not only is geological investigation an interesting subject of itself, but it is one which really commends itself to the minds of practical men as being a mode of saving money. It is an important thing that the dividends of those who choose to invest in these concerns should be made, and that their money should not be recklessly thrown away, as it is anything but pleasant to find that large sums have been spent which might have been saved, had the works been carried out according to the best rules of science. The third paper was to have been on the subject of the "Runic Inscriptions of Northumbria." This paper will be printed although it will not be read. That would have been an interesting paper for us to have listened to, because, curiously enough, the introduction of Christianity proved fatal to the existence of these Runic monuments. I believe that it was the Gothic Bishop Gulphialas or Ulphialas, of Sweden or Norway, who was supposed to have noticed that character; and it was mainly owing, as I believe, to the introduction of the Christian religion that those interesting and ancient inscriptions were destroyed and rendered so difficult to decipher. And they are difficult to decipher because of the extraordinary way in which the characters meander about the stones, instead of following the modern rules of writing either among ourselves or the Eastern nations; consequently, it becomes difficult to understand which way they are to be read, or in fact how they are to be deciphered. The other papers relate to the discovery of

ancient articles of clothing, and also of ornaments. Upon these I cannot say anything at all, as I have no idea of the date of those interesting objects. One of them is a ring, which appears to have been found at Driffield; and the other on a pair of ancient shoes, which were found with a skeleton on Austwick Common, Clapham. Not being myself a scientific man, I venture to supply my deficiency by bringing and laying before the meeting a sword, which was found upon an estate of mine in the North Riding. It was discovered by some men who were making a quarry on the side of a hill near my shooting-box. The scabbard is in a good state of preservation, whereas the sword is considerably decayed. It was found about twenty-five years ago, and has been lying about my house ever since; and it occurred to me, when Mr. Denny wrote and asked me to take the chair, I might supply my deficiency of scientific knowledge by exhibiting the sword; and if it only serves to puzzle the members of the Society I shall be perfectly happy.

Sir George William Denys, Bart., of Draycott Hall, Richmond, Mr. G. P. Wall, of Sheffield, and Mr. Robert Southern, Silkstone, near Barnsley, were unanimously elected members of the Society.

The following noblemen and gentlemen were elected as Officers and Council for the ensuing year:—

President.

THE RIGHT HON. THE EARL DE GREY AND RIPON, K.G.

Vice-Presidents.

THE RT. HON. EARL FITZWILLIAM.
THE RT. HON. EARL OF EFFINGHAM.
THE RT. HON. LORD WHARNCLIFFE.
THE RT. HON. LORD LONDESBOROUGH.
THE VISCOUNT MILTON, M.P.
HIS GRACE THE DUKE OF LEEDS.
HIS GRACE THE DUKE OF NORFOLK.
JAS. GARTH MARSHALL, ESQ., F.G.S.
THE EARL OF DARTMOUTH.
THE VISCOUNT GALWAY.
THE VISCOUNT HALIFAX.
THE LORD HOUGHTON, D.C.L., &c.
EDMUND DENISON, ESQ.
JOHN WATERHOUSE, ESQ., F.R.S.
JOHN SPENCER STANHOPE, ESQ.
EDWARD ACKROYD, ESQ., M.P.
THOMAS WILSON, ESQ., M.A.

Council.

DR. ALEXANDER.
H. C. SORBY, ESQ., F.R.S.
T. W. TEW, ESQ.
REV. W. C. LUKIS, M.A., F.S.A.
BENTLEY SHAW, ESQ.
RICHARD CARTER, ESQ., C.E.
REV. S. F. SURTEES, M.A.
REV. H. C. MIDDLETON, F.C.S.
THOMAS EMBLETON, ESQ., C.E.
WILLIAM CHADWICK, ESQ.
RICHARD REYNOLDS, ESQ., F.C.S.
ARCHIBALD BRIGGS, ESQ.

Honorary Secretary.

WILLIAM SYKES WARD, ESQ., F.C.S.

Assistant Secretary.

HENRY DENNY, ESQ., A.L.S.

Local Secretaries.

H. C. SORBY, ESQ., F.R.S., Sheffield.
DR. ALEXANDER, Halifax.
T. W. TEW, ESQ., Pontefract.
LOUIS C. MIALL, ESQ., Bradford.
REV. S. F. SURTEES, Doncaster.
BENTLEY SHAW, ESQ., Huddersfield.
RICHARD CARTER, ESQ., Barnsley.
DR. PALEY, Ripon.
JOHN GUEST, ESQ., Rotherham.

The ASSISTANT SECRETARY then read the annexed statement of receipts and expenditure for the past year:—

STATEMENT OF RECEIPTS AND EXPENDITURE

OF THE GEOLOGICAL AND POLYTECHNIC SOCIETY OF THE WEST RIDING OF YORKSHIRE,

From January, 1869, to January, 1870.

DR.	£	s.	d.
By 1 Subscription for 1864	0	13	0
,, 1 ,, 1865	0	13	0
,, 2 ,, 1866	1	6	0
,, 2 ,, 1867	1	6	0
,, 14 ,, 1868	9	2	0
,, 85 ,, 1869	55	5	0
,, 2 ,, 1870	1	6	0
	£69	11	0

CR.	£	s.	d.
By Printing and Advertising ..	25	12	6
,, Philosophical Society, for Rent of Museum Room ..	10	0	0
,, Collecting Subscriptions....	2	4	5
,, Lithographing Plates for Reports	1	14	3
,, Expenses of Meetings	1	10	9
,, Postage Stamps	1	9	10
,, Subscription to the Palæontographical Society for 1868 and 1869.....	2	2	6
,, Stationery	0	2	6
,, Carriage of Parcels and Reports.....	0	10	9
,, General Secretary on Account	24	4	6
	£69	11	0

His Lordship then called upon Mr. Daniel F. Mackintosh, F.G.S., to read the first paper.

ON THE NATURE, CORRELATION, AND MODE OF ACCUMULATION OF THE DRIFT-DEPOSITS OF THE WEST RIDING OF YORKSHIRE; WITH REMARKS ON THE ORIGIN OF ESCARPMENTS, VALLEYS, AND OUTLET-GORGES, AND AN APPENDIX ON THE CLIFFS OF PLUMPTON, BRIMHAM, GOREDALE, AND MALHAM. BY D. MACKINTOSH, F.G.S., ETC., AUTHOR OF "SCENERY OF ENGLAND AND WALES: ITS CHARACTER AND ORIGIN," AND PAPERS ON DRIFTS IN THE "QUART. JOURN. GEOL. SOC. OF LONDON."

[*For Plate and Explanation see Close of this Paper.*]

For the last six months I have been devoting almost undivided attention to the classification and correlation of the drifts of the West Riding, between York and Settle in one direction, and between Ripon and Barnsley in another. I started with the idea, which subsequent observations have confirmed, that it is only by a comparison of the characteristics of the drifts on plains with those in valleys and on hill sides that we can arrive at correct notions of the mode of their accumulation.

CLASSIFICATION AND DESCRIPTION OF THE DRIFTS OF THE WEST RIDING.

1. *Greyish-blue and Variegated Boulder-Clay.*—So far as I can ascertain, it is to the late Mr. Teale, of Leeds, that we are indebted for the discovery of two lower boulder clays, the blue and the yellow. He found patches of blue clay at New Wortley, Nether Green, Woodhouse Moor, Adel, and Yeadon Colliery, at various levels, and at Adwalton at a height of about 600 feet above the sea. At nearly all these places he found the blue clay overlain by the yellow clay. I have traced the existence of blue clay up the valleys of the Aire and Wharfe, and on the plain of Craven, where it is extensively developed. At lower levels, to the south-east and north

of Leeds, it exists only in patches. In the north-west part of the West Riding, where it lies near to, or on the carboniferous limestone, the stones and boulders in the blue clay are principally limestone; south-eastwards, the limestone pebbles and boulders decrease in number. Everywhere, but especially in the upland valleys, the stones are generally much rounded, polished, and scratched.

2. *Yellowish-brown and Variegated Boulder-Clay.*—Though there are very few sufficiently-clear sections to warrant the conclusion, I believe that both the blue and yellow boulder-clays run under the extensive beds of dark laminated clay and sand and gravel which spread out over the vale of York. One (if not both) of the boulder-clays has been found under the laminated clay and sand and stratified gravel of the vale of York. From low levels, the yellow clay extends up the valleys, and up the sides of the hills, until as a loam it thins out on the summits of the gritstone table-lands. The stones it contains are almost exclusively grit and sandstone at high levels, with a few limestone pebbles and boulders lower down, until at the bottom of the valleys, and on the plains, the percentage of limestone is often considerable. On limestone rocks, the stones in the yellow clay are often nearly all limestone (as at Malham and Goredale), indicating a difference in the sources of supply for the clay and the stones. On and near the summits of the table-lands, the stones, with some striking exceptions, are angular or subangular; but they increase in bluntness and roundness downwards, until in many places they graduate into an unstratified boulder-gravel. The Rev. J. S. Tute, of Markington, informs me that the brown clay west of Ripon contains a few boulders of Shapfell granite.

3. *Boulder Sand and Stratified Gravel.*—It is often difficult to discover a line of separation between the unstratified and stratified gravel. The unstratified gravel, generally speaking,

does not run into sand, while the stratified gravel is more or less associated with deposits of sand. The sand, in most places, contains boulders, angular as well as rounded. The nearer to the mountains the smaller are the sand and stratified gravel deposits; the farther from the mountains, and especially in the vale of York, these deposits attain a great thickness, and spread out over wide areas.

4. *Upper Boulder-Clay and Loam.*—In various places I have found this deposit capping knolls of sand, or forming the upper part of terraces and platforms of gravel. In some places it is distinctly separated from, in others it graduates into, the underlying drift. Besides the above, there is a deposit to which the vague term *warp* may be applied. It looks like a re-deposition, not by ordinary river-action, but by tides, at a time when the land was only slightly submerged. According to the late Mr. Teale (who, I believe without sufficient grounds, regarded it as a lacustrine formation), it nowhere rises higher than 150 feet above the sea level. As I have not had much opportunity of examining it, I shall take no further notice of this warp.

Sections of Boulder-Clays and Gravels in the Plain of Craven.—In a drain, at a low level, a short distance south of Settle, I saw a good section of hard blue clay, full of stones, and a similar clay may be seen at intervals in the railway cuttings between Settle and Skipton.* South-west of Settle a knoll consists entirely, so far as can be seen, of hard clay, with numerous large boulders of limestone. In the new railway cutting the clay is reddish-brown, but it is probable that there is blue clay underneath. The thickness, as shown in the river bank, cannot be less than 70 feet. The boulders are polished and scratched all round. Further south, in the new

* Since writing the above I have traced the blue clay underlying the reddish or yellowish-brown clay on the watershed traversed by the railway to the west of Settle, and nearly as far as the valley of Lune.

railway cutting, on the slope of a hill, the reddish-brown clay is very compact, and full of angular, as well as rounded stones. Near to where this cutting joins the old line of railway the reddish-brown clay overlies the blue clay, with a very distinct line of demarcation between them. Between Long Preston and Skipton, the part of the plain of Craven traversed by the railway consists of a very remarkable series of knolls varying from a few yards to at least 200 feet in height. The outline of these knolls, which is very curvilinear, is owing to the extent to which they are made up of drift. The Yoredale strata of the plain of Craven rise up to nearly, if not quite the highest, parts of these knolls in some places, and in most of the knolls there is probably a rocky projection which acted as a protector to a leeward tail of drift which formed a nucleus for a larger accumulation. In many places the whole height of a knoll, through which the railway has been cut, consists of drift, and as the drift (as shewn here and there by brook-sections) extends to a considerable depth below the level of the railway, we cannot resist the conclusion that in the plain of Craven the drift often reaches a thickness of at least 150 feet. The greater part of it, in the sections, appears to consist of yellow or reddish-brown boulder-clay, but a considerable part of it is blue clay. The stones in both clays are in general well rounded—indeed, often as much so as on any sea-shore. Both clays, but especially the blue clay, graduate into an unwashed, and unstratified or imperfectly-stratified, gravel, which in railway cuttings often looks like washed gravel, owing to rain washing away the clay and leaving the stones. The drifts of the plain of Craven have no connection with any river. They are most typically developed on the watershed part of the plain which lies between the courses of the Ribble and the Aire. To the north, north-west, east, and south of Skipton, we find knolls of drift similar to those above described. The Eller Brook

exposes sections at least sixty feet in depth, consisting chiefly of clay, with boulders of limestone, indurated shale, and grit. Above the blue clay, and resting on a very uneven and eroded surface, there is a thin covering of yellow clay, with grit and other boulders. About three miles north of Skipton, one side of a ridge consists of rock, the other side of drift. The blue clay, in many places near Skipton, contains shale in various stages of decomposition; and east of the Grammar School, in a brick-pit, the highly-inclined limestone shale may be seen, exhibiting various gradations in the process of being worked up into blue clay. The stones and boulders, chiefly from the alternating limestone bands, may likewise be seen quite angular, subangular, rounded, polished, and scratched. In the cutting south of Skipton railway station, the blue clay comes nearly to the surface. In a quarry near to this cutting, one of the finest sections I have seen in Yorkshire has been exposed. The blue clay may be seen resting on the contorted beds of limestone—in one place on their edges, in another filling up a synclinal hollow. The limestone nowhere in this quarry shows any signs of glaciation. Between the blue clay and the yellowish or reddish-brown clay above there is a very distinct line of demarcation.

[Mr. Mackintosh then described about forty sections of drift he had examined near Keighley, Hainworth-Shaw, Marley, Rombald's Moor, Bingley, Baildon, Guiseley, Holbeck, Headingley, Arthington, Follifoot, Ripley, Ripon, Littlethorp, south and west of Bramham, Marston Moor, York, Royston, &c., &c. On the various phenomena presented by these sections he founded his explanations of the derivation and mode of accumulation of the drift-deposits.—For a number of the sections, see Plate, with accompanying explanations.]

DERIVATION AND MODE OF ACCUMULATION OF THE DRIFT DEPOSITS OF THE WEST RIDING.

1. *The Greyish-blue Clay.*—The uniform character of this clay, and the fact that in the valleys traversed by the Aire, and in the plain of Craven (where the clay is principally developed), at least seven-eighths of the stones it contains are limestone, while the underlying rock and the rock forming the slopes and summits of the hills above it for great distances is often millstone grit,* renders it evident that this greyish-blue clay could not have been distributed either as *subglacial débris* moved forward by a great sheet of land ice, or the *supra-glacial* moraine of a valley glacier, for in both cases the local rocks as well as the rocks the ice must previously have passed over, would have been worked up into the clay and into the boulders. A rather shallow sea, as the land was gradually sinking, and a sea acting principally between about 300 and 600 feet above the present sea-level, would appear to have been the main cause of the distribution of the blue clay.† This sea could not have been much indebted to land-ice sliding down the hill sides or along the valleys, for such ice would have brought down a supply of materials different from those composing the blue clay. We are, therefore, driven to the conclusion that the ice which undoubtedly had a share in shaping the stones and boulders found in the blue clay was sea-ice, coast-ice, or ground-ice. Most of the stones found in this clay are much rounded, as if they had

* The occurrence of blue clay with a great preponderance of limestone boulders on millstone grit (as at Keighley) may be referred to an ice-laden current carrying materials, which, for great distances from the sources of supply, did not become much mixed up with local detritus.

† The shale and limestone which formed the principal sources of supply for the blue clay and its boulders do not rise higher than about 600 feet, and the surface of the sea which floated the boulder-laden ice could not have stood much higher.

been rolled, and not merely rubbed on one side. Ordinary wave-action on a sea beach would appear to have been a principal cause of their attrition. Comparatively few of them are uniformly striated. The scratches run *all round* the stones, and the small grooves cross each other at all angles. The striations, along with the polished surfaces exhibited by these stones, can be easily explained by the irregular and repeated action of coast ice. To coast-ice laden with boulders, stones, and *débris*, and floating on the surface of oceanic currents, we may likewise attribute the distribution of the coarser part of the deposit, which presents the appearance of having been dropped down on a sea bottom.* Above and around the more stony accumulations, we often find a considerable thickness of rudely-stratified clay with few or no stones, which may have been assorted by the ordinary action of the sea.† The blue-clay deposit is frequently made up of limestone and shale graduating from shale boulders down to fine clay. The greater part of it is evidently crushed or washed shale and broken limestone. At least seven-eighths of it would appear to have been manufactured out of what may be called the raw shale and limestone of the plain of Craven and ramifying valleys. It must have been principally derived from the lower Yoredale and upper limestone shales. The boulders would appear to have come chiefly from the low-lying limestones of the Craven district. I have principally examined the greyish-blue clay deposit in the valleys, valley-expansions, and plains between Leeds and Settle. Patches

* Not all at once, but in a successive manner, by different masses of floating ice, so as to prevent any general stratification resulting from the specific gravity of the materials.

† The facts presented by drift-phenomena, and not any prevailing theory, must approximately determine the degree of cold during any stage in the submergence or emergence of the land, and the nature of the accompanying glacial conditions, whether arising from astronomical or geographical causes, both acting in concert, or the one neutralizing the other.

of a dark clay, probably of the same age, with a greater or less per-centage of limestone boulders, may be found in the Wharfe valley; near Ripon; around Leeds; filling up abrupt hollows between Wakefield and Doncaster; in a railway cutting near Royston, &c.; but, instead of these patches being remnants of a much more extensive deposit nearly removed by denudation, their distance from the sources of supply, and their mode of occurrence, would, I think, render it more probable that they were never more than patches (though at one time probably larger), and that their deposition in abrupt hollows and protected situations was owing to the extreme activity of the currents sweeping over the areas where they are to be found; for we ought to remember that a force of current capable of denuding a deposit would be capable of preventing its deposition.*

2. *Yellowish-brown and Variegated Clay.*—It is not difficult to understand that, as the land subsided (either continuously or after a long interval) beneath the level which cut off the low-lying source of supply of the blue clay, the shales and sandstones of the upper Yoredale and millstone-grit formations composing the sides of the valleys and table-lands, would furnish materials for the yellowish-brown clay, with its boulders. This clay extends from the bottoms of the valleys

* In the area between Wakefield and Sheffield there is very little drift, if we except a very thin surface deposit with many angular, and occasionally a few rounded, stones, which are not the mere disintegration of the rocks underneath, and which may be looked upon as the gleanings left by the great scythe of denudation to which the ground owes its present configuration. There are, however, a few patches of what is usually called drift—one near Royston, already mentioned, and not far from it a considerable expanse of extra-rounded gravel, clay with rounded pebbles near Masborough station, a block of Shapfell granite, according to Mr. Green, F.G.S., in Royston, &c. These facts prove the sojourn of the sea in the area under consideration, and I think that the comparative absence of drift may be explained by supposing the area to have been a theatre of very active denudation, compared with the districts north and east, where deposition may have been in excess.

up to the highest summits of the moors. It contains very little limestone, generally speaking; and that little, from the positions in which it is found, would appear to have been floated by ice. Nine-tenths of the yellow clay formation is local, and must have been principally washed out of the hill-sides where it is found, or carried downwards, or *transversely* to the direction of the valleys. At the bottoms of the valleys, as at Bingley, it graduates into well rounded boulder gravel. On the summits of the table-lands, up to the height of more than 1000 feet above the sea, it is as much a boulder-drift as in the valleys—with this difference, that the matrix of the boulders and pebbles is more sandy than at the lower levels. During the accumulation of this drift, the table-lands and moors must have been completely submerged. On Rombald's Moor, Harden Moor, and elsewhere, blocks and well-rounded pebbles of a fine light-coloured sandstone called *calliard stone*, may often be seen in abundance. I have particularly examined those on Harden Moor, where, on the very summit the calliards lie on the millstone grit. Unless their presence can be accounted for by supposing them to be the wrecks of a formerly-existing calliard bed *in situ* (which several considerations render very improbable), or to have been floated by ice from the outcrop of calliard beds at a higher level on neighbouring moors, it is difficult to conceive how they could have been transported. About 150 feet lower down than those found on Harden Moor, there is a bed of calliard *in situ*. Land ice could not possibly have pushed up fragments from this bed without mingling them with *débris* collected during the *preceding* part of its course. But to those who are acquainted with what is now going on in the Baltic the supposition will not appear unlikely that these calliards may have been progressively moved up the hill side by stormy wave-action, combined with the action of coast-ice and ground

ice, during the gradual subsidence of the land, and that the largest stones may often have been thrown up to the highest levels—as we, indeed, find on ordinary sea coasts. What would take place to a limited extent on a sea coast at a stationary level might take place to an indefinite extent on a sea coast progressively embracing a whole hill side. In the north-west part of Yorkshire, boulders may be found which must have come from a lower level. I have found them on the hill north-east of Settle; and other instances might be mentioned in which land ice would not afford a satisfactory explanation of the phenomena. I may here remark that the glaciated rock-surfaces I have seen in the millstone grit district are on or near the summits of moors (though they are probably not absent from lower levels), as on Harden Moor, near Keighley (where I believe they were first discovered by the geological surveyors), and on Rombald's Moor. On the highest platform of Harden Moor the rock is glacially planed, and on the summit of the north cliff-line of Rombald's Moor, west of the headland called *The Calf*, the rock (very lately exposed under a bed of typical brown boulder clay) is beautifully planed, polished, and striated in a direction due west and east at a height (about 900 feet above the sea) and in a position relatively to the surrounding ground which forbids the idea of its having ever been reached by a valley glacier. During the gradual rise of the land, the yellowish-brown boulder-clay may have received additions in some places, while in others it may have been washed down the hill sides. The stones and boulders would become more and more rounded towards the bottoms of the valleys, until they graduated into accumulations of boulder-gravel, such as those seen around Bingley.

3. *Derivation and Mode of Accumulation of the Stratified Sand and Washed Gravel.*—The blue clay appears to have undergone a certain amount of denudation before the yellow

clay was thrown down above it, as its surface is generally uneven, and apparently eroded. The yellow clay presents indications of its having been denuded before the deposition of the sand and gravel. A part of the sand may have been derived from the yellow clay, which is often more or less arenaceous, and a part from the direct denudation of the local carboniferous grits and sandstones. The sand seldom rises higher than about 350 or 400 feet above the present level of the sea. In the Aire valley, where I have principally examined it, it is evidently of the same age as the great sand formation of the vale of York, though in the vale of York the distinction between the sand and stratified gravel is generally better defined. About Keighley, Marley, Shipley, &c., the sand irregularly alternates with washed gravel. Both the sand and washed gravel contain boulders, as already stated, and from the position of these boulders it is evident that they must have been dropt in. The action of floating ice, therefore, could not have ceased during the deposition of the sand. In the vale of York, and likewise in the Aire valley, the sand contains perfectly *angular* boulders, as well as boulders more or less rounded. During the deposition of the sand there would appear to have been rapid currents in a shallow sea. The deflected and eddying action of these currents in peculiar situations would be likely to leave an undulating surface, varied by abrupt eminences. But the undulations left by deposition must have been modified by contemporaneous or subsequent denudation, for on a very uneven surface of sand (a surface unconformable to its stratification) an *upper boulder-clay* has been deposited. It may either have been derived from the denudation of the yellow boulder-clay, or from a direct denudation of shale and rock; and it is difficult to explain its position above the sand without supposing a slight reversion in the movement of the land, or a second partial subsidence.

4. *Final Denudation of the Drift-Deposits of the West Riding.*—I have hinted that the shape of the surface of drift deposits may have been partly left by deposition; but the frequent cropping out of the laminæ on the side of a sand-hill, as if they had all been cut off, the capping of sand hills with boulder-clay, the existence of two or more drift-formations in one hill, irrespectively of the contour or shape of the hill, and other facts, would seem to show that the drifts collectively must have been subjected to a sweeping denudation, which, according to the form of the valleys, and the direction of the currents, must have left flat terraces or expanses of drift in certain positions, and gently undulating knolls or abrupt eminences in others. The only cause with the mode of operation of which we are acquainted which could have left the numerous undulations in the drift-deposits of the West Riding is the deflected and eddying action of oceanic currents. The boulder-clay and boulder-gravel knolls of the plain of Craven display an almost perfectly curvilinear outline, which here and there graduates into hollows with no outlet for the surface-drainage. The knolls diversify a plain which could never have been subjected to the action of a valley-glacier, supposing a land glacial period to have succeeded to the deposition of the latest drifts of the West Riding. Atmospheric action could never possibly have given rise to the geometrical exactness of the outlines presented by these drift-hills. Atmospheric action is now making unsightly ruts down their smooth and continuous slopes. But it is difficult to resist the belief that the current-action which accomplished the last great denudation of the drift-deposits was much more powerful and sweeping than the ordinary action of tidal currents in existing estuaries and bays. Without, however, asserting that manifestations of marine agency capable of accounting for the final great denudation of drift-deposits may not yet be discovered in certain

parts of the world—in high, if not in low, latitudes—I would remark that many American geologists have lately found it difficult to explain all the phenomena presented by the enormous accumulations of boulder-drifts exposed by the railroads of British North America without coming back to the theory they now believe they too hastily rejected, namely, that, during the breaking up of the glacial conditions of the northern hemisphere, marine aqueous action acquired an intensity which, so far as we know, has not since been paralleled.

5. *Irregular Terraces in Drift.*—In the West Riding of Yorkshire, as well as in nearly every part of England and Wales, there are innumerable small terraces. The most striking I have seen are in the neighbourhood of Spofforth, Settle, and Malham (see plates). The last are the most worthy of consideration. They are chiefly in the yellowish-brown drift, but I have no doubt that in some places they are wrought into the solid rock. They may be seen on the east side of the Aire valley up to a great height above the river, both on steep slopes and on slopes at an angle of only two or three degrees. They are very seldom horizontal, but dip with the hollows and rise with the ridges. They generally present a rude parallelism, but are never perfectly regular. They conform to the longitudinal contour of the ground. To the north of Malham they are more ridges and furrows than terraces, and run not along, but *down* the face of the slope. Their mode of occurrence shows that they were only formed *along* the face of a slope when it happened to lie in the direction of the moving cause. In other cases they cross slopes in ascending and descending order. They thin out, reappear, swell, and diminish. They are very similar to the vast majority (not all) of the terraces of the chalk districts of the south of England; and in Yorkshire, as well as the south of England, in places where the terraces happened to approach regularity,

or to occur on a steep slope, they may have been taken advantage of, modified, or imitated by man for economical purposes. In the north of England, some of the geological surveyors, I believe, are disposed to regard them as the effects of land glacial action. For reasons which may be gathered from this paper, I am more inclined to look upon them as the marks left by currents laden with floating ice during the last great denudation of drift-deposits. The fact that there are terraces of artificial origin on hill sides in many parts of England, is no more a reason why we should regard the vast majority of drift-terraces as made-earth, than the existence of artificial mounds is a proof that all drift-knolls were piled up by man.

6. *Limits of River Action.*—Since the glacial submergence, rivers have been occupied in cutting well-defined channels in drift-deposits. In most parts of the valley of the Aire, they have not yet got down to the solid rock, and there is reason to believe that between Bingley and Skipton the drift in some places fills up hollows which at one time may have been lake-basins. The river deposits consist of small pebbles,* never spread out continuously for great distances, but, confined to patches or ridges, and of a nearly stoneless sand and loam, deposited over considerable areas. The rivers are not giving rise to boulder-deposits, or, with a few exceptions, to original drifts of any kind. A little investigation will show that where patches of pebbles are found in the river channels they have generally been washed out of boulder-drifts in the immediate neighbourhood. It may further be remarked that the stones and boulders of the valley drifts are often in positions where they could not have been left by river action, even supposing the rivers to have been formerly much larger

* These remarks are not intended to apply to mountain-torrents, or streams with considerable inclination of channel, which are capable of moving large stones during floods.

than at present—the abundance of limestone boulders and pebbles in the lower part of the course of the river Worth, for instance, where the river could only have brought down grit or sandstone. Dr. Milligan and Mr. Bottomley have satisfied me that at least one of three specimens of *Gryphæa*, found by them at Keighley, was obtained from the blue clay, and they believed that the other two had come out of the blue clay or overlying drift. If, as seems possible, these fossils were floated by ice from the north-east of Yorkshire, they must have come in a direction very different from that in in which the river Aire flows, and from no point of the compass could they have been brought by that river. The so-called gravels of the West Riding valleys often rise more than 100 feet above the river channels (as at Bingley, where, from the surface downwards, they contain numerous boulders up to five feet in diameter, placed at all angles, and often striated), and there they are of the same nature as gravels found remote from rivers, at greater elevations, while at both high and low levels they graduate into the yellowish-brown boulder clay which rises to the summits of the moors. But an attentive examination of the sections will be sufficient, without any further remarks, to show that the gravels described in this paper are quite distinct from river gravels.

7. *Limestone Blocks resting on Millstone-grit.*—I have found small boulders of limestone in drift resting on millstone-grit up to about 900 feet above the sea, above Slippery Ford, near Keighley; and I have been informed that limestone boulders have been dug out of pits on the south and south-west side of Rombald's Moor at nearly the same height; but I have to thank Mr. Varley, C.E., of Skipton, for pointing out to me the existence of two large blocks, with smaller fragments of limestone, under a cliff, and resting on a platform of millstone-grit, at the south-west corner of Embsay Moor, at a height of about 1,100 feet above the present sea-

level, and Mr. Varley informed me that he found them on the other side of the moor, facing the Wharfe valley, at about the same height.

Remarks on the Origin of Escarpments.—We do not stand in absolute need of the occurrence of erratic blocks as a proof that the moors of north-west Yorkshire were once under an ice-laden sea. The amount of decomposed shale and the number of stones and boulders entering into the composition of the drift-deposits can only be explained by supposing that a corresponding amount of denudation, as we have seen, must have mainly taken place on sea-coasts. The sea could not have abstracted the shales from the hill-sides without leaving indentations and undermining the overlying harder strata, so as to leave steep escarpments and cliffs. At a stationary level, the terraces would be rendered more or less horizontal, but as the land gradually moved up and down the sea would follow the outcrops of the shales so as to leave inclined or irregular terraces. The shales would often be left forming the platforms, or lower parts of the superjacent escarpments, but the sea would likewise, where its action was sufficiently persistent, wear out a terrace in the more solid rocks, and accordingly we often find terraces with both platforms and cliffs consisting of hard rock—for instance, on the south-west and west side of Embsay Moor, on the Rombald's Moor side of the valley between Skipton and Bolton, on the western side of Brimham Moor, &c., &c., (see plate). Many of the platforms of the terraces of the West Riding are covered with drift containing rounded among angular stones, generally local, but sometimes erratic (on the north side of Harden Moor, both sides of Rombald's Moor, and in innumerable other instances). This drift exactly corresponds with what one might suppose to have been deposited on a sea-beach, with a steep declivity below, under mixed glacial and marine condi-

tions. The cliffs and platforms of the Yorkshire moors could not have been formed by rain, because on hard rocks and on grass-covered shale rain cannot act in a state of dispersion so as to leave longitudinally-continuous indentations. When rain-water acquires denuding power by becoming concentrated into streams capable of washing down hill sides, it always tends to produce, not *horizontal* indentations or continuous terraces, but gulleys at considerable intervals *down*, and not along, the faces of the declivities. Where terraces already exist, rain-torrents tend to break up their longitudinal continuity.

At the base of, and insinuated into, the crevices and cavities of the cliffs, at Plumpton and elsewhere, we often find foreign pebbles, with or without clay, which show that something more than atmospheric agency has there been at work; and a detailed examination of all the phenomena connected with these rocks, with the Brimham rocks, the Wharncliffe rocks, and many other inland cliffs, would, I am convinced, lead to the conclusion that the sea has washed away the softer beds at a lower level; abstracted large blocks and removed them to positions where they could not have fallen; excavated narrow inlets up inclined planes; rounded many of the loose blocks, piled them on one another; and performed other feats entirely beyond the power, and incompatible with the mode of operation, of atmospheric agents.

Wind charged with sand, and its action concentrated by pre-existing indentations, has modified the shapes of many of the rocky pillars on Brimham Moor and elsewhere, but it could not have formed the cliffs, abstracted blocks so as to leave passages between pillars,* left uniformly ground-down

* The sides of these passages often consist of unweathered divisional planes, and where these planes have been acted on by rain, vertical small furrows have resulted.

prominences or ground-out hollows irrespectively of the structure of the rocks, or undermined pillars so as to leave the upper parts projecting. On Brimham Moor, many of the most striking pillars are close on, or near to, the verge of high cliff-lines, and they have undercut sides facing directions from which wind charged *with sand* could never have assailed them.*

Origin of Valleys and Outlet Gorges. — Professor Phillips long ago noticed the extent to which the contours of the valley-systems of Yorkshire were independent of the direction of the drainage, and no unbiassed observer can make a survey of the hilly districts of the West Riding without seeing that fresh-water drainage could never have excavated the principal valleys. In these districts there are innumerable valleys which cross watersheds, varying in depth from a few yards to more than a thousand feet. Though small streams flow down both ends of these passes, they may be called riverless valleys, and the amount of excavation in the middle, where no streams exist, has generally been greater than towards the two ends—that is to say, the sides of the passes rise highest in the middle. The passes between Skipton and Bolton, and between Skipton and Rilston, may be taken as average examples. It would be little else than a waste of words to endeavour to show that these valleys could never have been excavated by fresh-water streams. What are called river valleys are here and there connected by riverless valleys, and on examining one of these valleys—the valley of the Aire, for instance—we find that it consists of a number of valleys pointing in various directions. *Across* rather than *along* these valleys the rivers flow. The valleys have a contour independent of the channels

* Professor Ramsay's suggestions to Mr. Green, relative to the undercut millstone-grit pillars on the High Peak table-land, will not apply to the Brimham Rocks.

or courses of the rivers, and, were the connecting gorges through which the rivers escape to be blocked up, as they apparently once were, the valleys would be occupied by lakes. The rivers, in order to find their way to the sea, have repeatedly to change their course, and, were it not for the existence of outlet gorges, they would be unable to reach the sea at all. The rivers in pre-glacial times, as they flowed over the barriers of lakes, may have excavated some of these connecting gorges in hard rocks, as rivers in post-glacial times have forced their way out of lake-basins in drift by scooping out channels; but there are many instances in which the outlet gorges could not have been excavated by rivers, especially those where the levels of the lakes could not have reached, or nearly reached, the height of the barrier. This remark applies to the Don and the Went, which, after flowing along valley-expansions, make their escape through narrow gorges in the Permian Escarpment. There is reason to believe that the gorge at Went Bridge was first opened by one or more fractures or faults. This may have occurred under the sea, in which case currents may have cleared out and enlarged the gorge. But in whichever way the gorge of the Went was formed, it presents clear indications of having been subjected to the action of the sea during the last submergence of the land. These indications consist principally of a peculiar style of honeycombing which shows that the cavities must have been regularly ground out by a forcible agency, such as that of sea waves charged with sand or other solid abrading matter. We may see the difference between these pits and cavities and those now eaten out by atmospheric agency in an old quarry near the lower end of the gorge. The latter are invariably rough, and conform precisely to the unequal composition of the rock.

APPENDIX.

DETAILED NOTES ON THE PLUMPTON AND BRIMHAM ROCKS, WITH REMARKS ON GOREDALE AND MALHAM COVE.

The Plumpton Rocks.

1. Above the cliffs there is an extensive plateau on which the bare rock comes sometimes to the surface, but is in general covered with a sandy soil, or *débris*, containing rounded pebbles and small boulders. To the north of the cliffs there is a low ridge covered with rounded stones, and similar stones may be found in the valley under the cliffs. The stones are chiefly hard fine-grained sandstone and a kind of quartzite, and they must have been drifted from a greater or less distance—their parent rocks being found to the west or north-west,

2. Towards the north end of the range of cliffs I saw a curvilinear cavity containing rounded stones, most of them erratic, which extended into recesses where it is very unlikely they could have been thrown in by human hands. These stones may possibly have helped to grind out the cavity. In several other cavities I found similar stones. In some places the cavities contained a little loose grit, indicating the action of wind, or possibly of rabbits, though I afterwards saw reason to conclude that much of the loose grit in cavities must have been blown in from the gritty soil lying on the summit or at the base of the cliffs.

3. An insignificant stream, during heavy rains, may *flow* along the valley in front of the rocks (when I saw it the water seemed quite stagnant), but the few hundred yards in length of the water-collecting surface south-west of the watershed could never have rendered this stream sufficient to remove good-sized stones, or round them by attrition.

4. Arrived at a wide passage between stacks of rock, partly filled with powdered grit in a way showing that the grit could not have crumbled down from the sides of the cavity, but must have been *washed in horizontally*. At nearly right angles there is a narrow passage partly filled with grit, in addition to angular and rounded stones, some of them of considerable size.

5. Arrived at two small caves with flat bottoms—these caves evidently ground out, not weathered out. On the side of one of them, near the entrance, weathering seemed to have just commenced, and the *rough surface* resulting from it contrasts strongly with the smooth sides and roof of the cave.

6. In most places the fronts of the cliffs, or the parts of them facing the valley, present large *jointage-planes*, in places slightly roughened by the weather, in others lichen-covered.

7. Here, a joint half-a-foot wide has been crammed full of both

angular and rounded stones, which apparently did not fall in from above. A rather large stone has been jammed in under a number of other stones, some of them *erratic*. The sides of the joint, where exposed, exhibit no appearance of weathering. In the neighbourhood there is an unweathered joint from twelve to eighteen inches wide, which has been filled to a certain height with grit and stones; but here, as in other places, the infilling matter could not have been washed in by rain.

8. Another joint filled with grit and stones which could not have crumbled down (the sides of the fissure up to the top being unweathered) or fallen in. At the top of a neighbouring filled-up joint there is a good-sized cake-shaped stone crammed in, with its upper edge projecting. The form of the rock-surface here, as in many other places, shows that rain could not have filled up the joint.

9. In a large winding passage, the smooth and rounded rocky walls run deep down, *unaltered in form*, beneath the infilling of grit. In one part of this passage, six feet wide, the walls are evidently parallel jointage-planes, from between which masses of rock must have been abstracted, and that not by mere granular dissolution, as this process would not have uniformly stopped short at the remaining jointage-planes. To attribute the removal of the missing rocks to rain would be absurd, seeing that rain has left the jointage-planes intact. It is almost impossible to resist the impression that these passages must at one time have been traversed by waves capable of sweeping away fragments and blocks of rock.

10. In many parts of the ramifying passages near the artificial lakes, to which wind and rain have little or no access, a powerful agency, such as sea-waves, must have *ground* away the rocks so as to leave smooth and rounded projections and concavities. In front, or facing the lake, the rounded form of the cliffs is in many places the same above and beneath the talus of loose grit, showing that the talus must have been thrown up against the base of the cliffs, or washed down from the loose grit covering the top of the cliffs. The latter is not a disintegration *in situ*.

11. The cliffs above the lake have in many places been rounded on a large scale, irrespectively of the structure of the rock.

12. At this point rain has lately been washing down loose grit from the covering of the upper surface of the stack of rock. Much of the grit occupying certain positions at the bases of the cliffs, or in passages, has in this way been transferred from the summit, and not derived from the weathering of the cliffs.

13. A great deal of the undermining and rounding has taken place along the bases of cliffs rising from ground so flat, or so very slightly inclined, as to have prevented the washing away of the resultant detritus by rain.

14. The large fallen masses rising out of the lake in front of the cliffs occupy positions indicating a more powerful undermining cause than any form of fresh-water agency which could ever have existed in this small valley.

15. At the south-west end of the lake, the cliff-line has been deeply indented by an exceedingly picturesque winding creek, the greater part of which must have been scooped out by an agency capable of acting on level ground. This creek presents an intensely sea-coast aspect.

16. Between the lake and the Harrogate road, one may see a nearly square aperture, about four feet in diameter, and from fifteen to twenty feet long, the roof, floor, and sides of which show that it has not been left by weathering, but by the abstraction of fragments or blocks. Near it a rounded large stone may be seen in a joint. In this little-visited part of the Plumpton grounds, the *continuously perpendicular* cliffs rise above, and extend below the surface of the talus in a way demonstrating that the talus has not resulted from the decay of the cliffs, and that the cliffs must have existed before the talus began to accumulate. In this neighbourhood there is a cave with a rocky floor longitudinally level, so that rain could not have washed out detritus; and the rock composing its sides is too hard to be abraded by wind, supposing it to be accessible to wind, which is rather doubtful.

General Remarks.

Among the Plumpton Rocks, but especially towards the south end, the impression cannot be resisted that, where the weather acts, it is on previously-existing cliffs which the weather could not have formed. The weather here is a modifier, or rather a destroyer—certainly not an originator.

As regards mere rain, it ought to be recollected that the most characteristic features of the Plumpton Rocks are to a great extent protected from its action, and that rain-drops, on *pervious* gritstone, sandstone, and sand, have very little abrading power. Where the summit-area of a rocky stack is adapted to collect rain-water and concentrate it into minute runlets—where these runlets become charged with a little loose surface-grit—where they fall over the brink of a cliff, and meet at some distance below, with projecting masses of rock, they wear out vertical furrows in these masses, as may be seen near the south end of the lake. But while there are a few instances of these vertical furrows among the Plumpton Rocks, they are evidently a super-imposed form of surface configuration quite distinct from the typical shape of the rock surfaces, which must therefore have been produced by a different cause.

The undercutting or undermining of the Plumpton Rocks has, on a small scale, often followed the structure of the rocks, and been directed

by the existence of comparatively soft matter. But the denudation of the cliffs on a larger scale has frequently crossed the false bedding and oblique lamination, and even the more massive stratification, in a way indicating a cause much more powerful than any subaërial agency.

In front of the cliffs, and more especially along the bottoms of the wider passages, where bare rock is accessible, it may often be seen that *the sites of the rocks which have been carried away consist of as hard grit as that composing the sides of the passages*—thus showing that the passages did not result from the washing out of softer matter, but from the abstraction of solid grit by an agency propelled in particular directions. In many instances this agency would appear to have *acted uphill along an inclined plane*, and to have abstracted the rocks now missing by a revulsive effort, as sea-waves now act in narrow inlets on coasts. The infilling of the passages with the existing grit and loose stones must have occurred subsequently to the excavation of the passages, and was probably brought about partly by the action of the sea, and partly by the more recent action of rain.

The Brimham Rocks.

Near Brimham Hall, on the face of a slope, there are several very striking rocky projections consisting of laterally detached cliffs with tails graduating into the ground above (like skylight windows on the roof of a house), and perfectly detached and circumdenuded stacks. In most places the general slope comes up to the base of the rocks, but where weathering has taken place the fallen grit or sand forms a small underlying ridge. On the side and at the base of one rocky projection, there are rounded stones, including a large boulder imbedded in grit.

Near the base of the slope there are three stacks in close proximity. One of them about twenty-four feet, and another about fifteen feet high, are separated by a narrow passage with a hard rocky floor. On the west or overhanging fronts of both stacks a regular and apparently unweathered concavity looks as if it had been ground out by a powerful agency, probably ice wielded by water.

Nearly on a level with the valley at the base of the slope or escarpment, there is a striking stack of rock, about twenty-four feet high, with a concavity on its west side, and rounded as well as subangular stones beneath its undercut base. Some unknown cause seems to prevent the accumulation of fine grit or sand in such situations, and likewise the growth of grass. Some of the pebbles may have been gathered off the surrounding field and thrown in. They consist of a kind of quartzite, Permian limestone, and other rocks foreign to the spot, as well as grit. Under a smaller stack close by, pebbles of different rocks may be seen packed up in a recess. In some cases among these rocks, blown rain

has probably, by a revulsive action, bared their bases by washing back to a distance of two or three feet previously-deposited loose grit.

The slope under the parts of the above rocky stacks now undergoing decay, is too slight for rain to carry the decomposed grit or sand away. The rain sinks into the sand, and remains till it is evaporated. The bottom of the valley at the base of the slope, and within a few yards of the lower stacks, consists of clay, with rounded stones in its upper part at least. The absence of a section of the clay prevented my seeing whether it was argillaceous shale *in situ*, or a boulder drift (*see plate, fig.* 14). In either case, the bottom of the valley ought to be covered with sand according to the subaërial or "wash of rain" theory of the denudation of the rocky stacks. The rocks, now missing, by which these stacks were once joined together, would appear to have been swept clean away, with the exception of a little loose grit and sand. On the field around the unscathed rocks, rounded pebbles (as before stated), may here and there be found attesting the marine nature of the denudation by which the rocks were left.

In a quarry to the north of the above rocks, the line of demarcation between the hard gritstone and the coarse sand and detritus above, is so sharply defined as to show that the latter is not a disintegration *in situ*, but a local drift.

Goredale.

The entrance to Goredale is a large irregular cove bounded on each side by terraced slopes, and terminated behind by a wall of limestone rock, hollowed out into a smaller cove, which is breached at its inner end by a very narrow gorge. The reddish-brown clay of the plain of Craven, with a few sandstone mixed with numerous limestone boulders and pebbles (some of the latter scratched and striated all round), rises up on each side of the entrance to Goredale, covers the bottom of the valley, underlies the brook, and runs up as far at least as the mouth of the smaller or inner cove, where it is replaced by numerous angular blocks. The inner cove is bounded on three sides by a continuous wall of rock, except where the brook makes its entrance in the form of several cascades. A part of the cliff on the right-hand overhangs its base at an angle of at least 20 degrees from the perpendicular. Near its summit there is a noticeable pothole or smooth concavity. The inner and upper part of the rock on the left likewise overhangs. Its face is indented by a rough horizontal groove about half-way up, and a smooth groove near the top—both, I believe, the work of the sea. The height of the cliffs has been exaggerated. On the right-hand side the overhanging cliff rises above its base to a height of about 130 feet at one part, and 160 feet farther on. The cliff on the left is about 160 feet high, but the lower part, immediately above the stream, projects in the form of a

narrow terrace about 30 feet in height. The whole presents the appearance of being the effect of the conjoint action of the stream and the sea —the present cliffs bounding the outer and inner coves having been left by the undermining action of currents and waves about the time when the adjacent drift was deposited.

Malham Cove.

The South Craven Fault coincides with the slope or escarpment in which Goredale and Malham Cove have been worn back. The valley which terminates in Malham Cove strictly so-called is more or less covered with the reddish-brown drift already mentioned. Nearly as far as the inner termination of the cove many boulders may be seen in positions where they could not have fallen, and to which, therefore, they must have been carried. Not a few of the boulders are regularly lithodomized—the holes (about two-thirds of an inch in average diameter, and often three inches in length) running at various angles from obliquely upwards to vertically downwards.

The cove is terminated by a wall of limestone rock in most places quite perpendicular, excepting where it overhangs. The average height of the vertically-continuous and perpendicular precipice cannot be less than 250 feet. The infant Aire rises from beneath the cliff-line on the left-hand side; and there is the appearance, in the shape of a shallow gulley, of a stream having once, perhaps repeatedly, flowed over the brink of the cliff-line. But the face of the cliff-line runs along so continuously as to forbid the idea of a narrow stream, either above or below, having formed it by either an eroding or undermining process. It looks exactly like the work of the sea insinuating itself into a pre-existing deep ravine, and excavating it backwards so as to flatten its floor,* and leave a semicircular wall of rock. The various stages in the process of converting a ravine into a cliffed cove may be seen on many existing sea-coasts.

EXPLANATION OF PLATE.

Fig. 1. *Section in a Quarry South of Skipton.*—(A) Carboniferous Limestone; 1. Greyish-blue clay, with a few boulders; 2. Yellowish-brown clay, with many stones, running into stoneless sand and loam, (D); (B) Nearly stoneless layer of loam.

Fig. 2. *Sea-terrace carved out of Millstone-grit between Skipton and Addingham.*—It is traversed by the upper or old road.

Fig. 3. *Sea-terrace, with Limestone Boulders resting on Millstone-grit, S.W. corner of Embsay Moor, near Skipton.*

* There is, indeed, the appearance of the bottom of the cove having been once a shallow basin, the outer barrier of which has been breached so as to allow the present stream to escape in the direction of Malham village.

Fig. 4. *Section at Beach Mills, Worth Valley, Keighley (now built up).* (A) Between six and eight feet of purplish-blue clay running into yellow clay and sand, with a few stones; (B) Slightly-laminated blue clay without stones; (C) Greyish-blue clay with many stones of all sizes up to 4 ft. in diameter—at least 80 per cent. limestone. Stones rounded and polished, and scratched and striated in various directions. Thickness not ascertained.

Fig. 5. *Section from Harden Moor to North Beck, Keighley.*—(A) Outcrop of calliard bed *in situ*; (B) Old sea-beach of yellowish-brown boulder clay; (C) Rounded calliard stones and boulders; 1. Greyish-blue boulder-clay reaching a thickness of from 40 to 50 feet; 2. Yellowish-brown boulder-clay; 3. Confusedly-laminated sand and gravel reaching 50 feet in thickness. In a direction at right angles to this section, or towards the west-south-west, the clay (2) rapidly thins out.

Fig. 6. *Section of a Sand-pit at Marley, near Keighley.*—3. Sand about 20 feet in thickness; 4. Loamy clay with boulders up to 2 ft. in diameter, lying at all angles, about 10 ft. in thickness. The sand shows clear traces of denudation before the deposition of the clay, and both clay and sand must have been afterwards denuded.

Fig. 7. *Section near a Farm-house North of the White Hart Inn, on the road between Aberford and Bramham.*—The knoll is nearly the highest part of the district (between 200 and 250 feet above the sea). (A) Permian limestone, overlain by patches of dark clay, and sand; 3. Gravel, consisting of well-rounded pebbles and boulders in a sandy matrix, about 10 feet in thickness; 4. Reddish clay, with rounded and subangular stones up to 2 ft. in diameter, consisting of sandstone, millstone-grit, carboniferous limestone, chert, local Permian *débris*, &c.

Fig. 8. *Section across the Aire Valley near Bingley.*—2. (N.E. side of the railway) Boulder-gravel running upwards into loamy clay. The boulders reach a size of 5 feet in average diameter, and consist principally of grit and sandstone. Some of them are decidedly striated. There are many small and extra-rounded pebbles, a large per centage of which are limestone. 2. (Between the railway and the river) appears to consist mainly of rounded stones up to 5 feet in diameter, in a matrix of clay or loam. I believe the blue clay might be found underneath, as a short distance to the North-west of the section I saw it in the river-channel under the yellowish-brown boulder-clay and loam. The bulk of the drift in the neighbourhood of Bingley consists of boulder-clay, and I have not been able to recognise the great expansions of so-called river-gravel mentioned by Mr. A. Tyler in his paper in the *Quart. Journ. of the Geol. Soc.*

Fig. 9. *Mode of occurrence of the Sand-hills on one side of the Aire Valley, near Esholt.*—The sand contains boulders of millstone-grit, limestone, &c., some of them nearly angular. Their positions show that they must have been dropt in. The laminæ are crossed by nearly vertical streaks. The sand is covered by, or runs upwards into, loam and clay.

Fig. 10. *Section near Holbeck Station exposed by a cutting in the Leeds and Harrogate Railway.*—(A) Carboniferous sandstone; 2. Yellowish-brown loam and clay, with many rounded and subangular stones, and a few boulders, consisting of sandstone, millstone-grit, fragments of *Stigmaria*, quartz, &c., reaching 12 feet in thickness. It is difficult to say whether this plateau of drift was deposited before the valley of the Aire existed, or whether its deposition was continued in a northerly direction so as to fill up that valley, and afterwards removed as far as the south side of the canal by a process of re-excavation.

Fig. 11. *Section near the South and North entrance to the Arthington Railway Tunnel.*—Near the north entrance the yellowish-brown boulder-clay would appear to have been so violently driven against the rocky cliff as to make the one

graduate into the other. I believe the blue clay here underlies the yellow, as it does in other parts of the valley of the Wharfe, but the section is much obscured by talus.

Fig. 12. *Section exposed by Excavations in connection with the Headingley New Waterworks* (Feb. 1870).—(A) Purplish-blue clay with a few boulders, very compact, and fracturing like igneous rock, excepting where it frequently runs into sand. It reaches a thickness of at least 26 feet: (B) Metalliferous laminated sand, traversed by splashy seams of purple loam; (C) Yellowish-blue and variegated clay, with many boulders of sandstone, millstone-grit, &c., reaching an average diameter of at least 5 feet. I found twigs of plants where the boundary between the lower and upper clays was too indistinctly marked to warrant their being referred to the one or the other.

Fig. 13. *Section of Laminated Sand and Purplish-blue Clay in another part of the Headingley Excavation.*—The clay and sand partly represented in the above two sections is limited to a basin or trough less than half a mile in diameter. The slope rising from it on the eastern side is covered with sand, and farther on, in a quarry, reddish-brown boulder-clay is seen resting on rock.

Fig. 14. *Section exposed by the Railway Cutting between Pannal and Spofforth.*—(A) Carboniferous sandstone; (B) Boulder sand and loam with yellowish-brown and blue clay (order of succession not ascertained).

Fig. 15. *Section in a Quarry near Aldfield.*—(A) Permian marl slate; 1. Black clay; 2. Brown clay, both containing scratched and polished boulders. The brown is the usual surface clay of the district. It has a rough stratification, generally inclining to the east. *(Communicated by the Rev. J. Stanley Tute, of Markington.)*

Fig. 16. *Section close to Ripon Railway Station.*—(A) Dark laminated stoneless clay, evidently an outlier of the great expanses of laminated clay in the vale of York—horizon and relative age still unknown; (B) Light red sand; (C) Dark red sand, with a few pebbles, about 7 feet in thickness.

Fig. 17. *Roadside Section near Ripon Railway Station.*—(AA) Fine gravel; (B) Sand; (C) Sand with a few pebbles.

Fig. 18. *Section in a Brick-pit near Littlethorpe, Ripon.*—(A) Variegated boulder-clay and loam, called "carrion;" (B) Coarse sand with small pebbles, and fine red sand without pebbles; (C) Alternating yellow, blue, and brown beds of finely laminated clay without stones, about 12 feet in thickness.

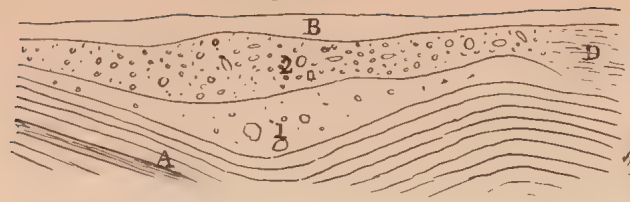
Fig. 19. *Section in a Brick-pit a little farther north.*—(A) Red false-bedded sand; (B) Thin layer of stones; (C) Dark laminated stoneless clay.

Fig. 20. *Typical structure of the Cliffs on the north-west side of Brimham Moor, shewing the effects of a powerful undermining cause not assisted by the waste of softer rocks.*

Fig. 21. *Irregular Terraces and Ridges on the eastern slope of the valley of the Aire, south of Malham.*—They are merely a part or variation of the general configuration of the slope. Near Settle, many of the terraces are probably raised beaches or tidal ridges.

Note.—(*July*, 1870.)—One of the officers of the Geological Survey informs me that while in the neighbourhood of Leeds he heard of unfossilized seashells being obtained from the blue clay at an almost fabulous depth, near Seacroft, during boring operations. Information on this point will be thankfully received by Mr. Denny, Philosophical Hall, Leeds. The yellowish-brown boulder-clay covers a great part of the surface between Seacroft and Bramham, but I do not recollect having there seen any very decided section of the blue clay, though it probably underlies the yellow in some places. D. M.

Fig. 1.



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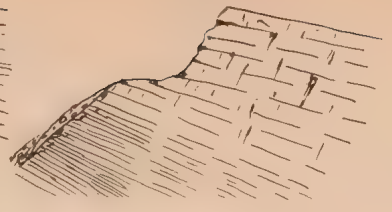

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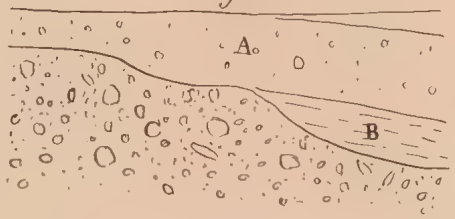

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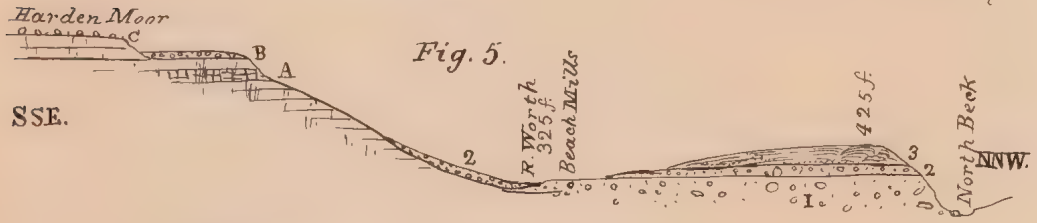

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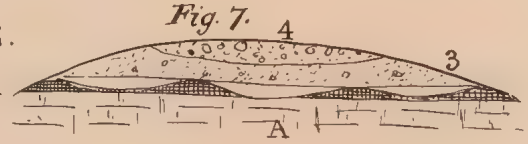

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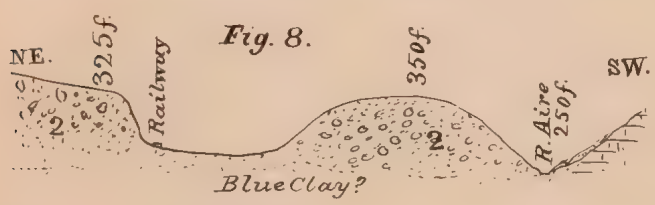

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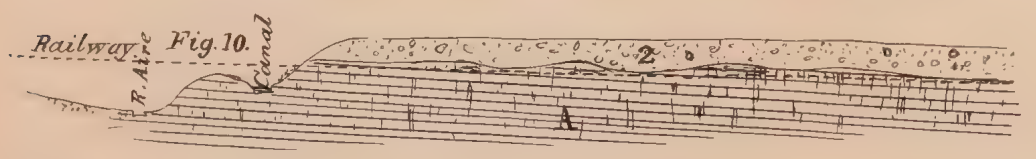

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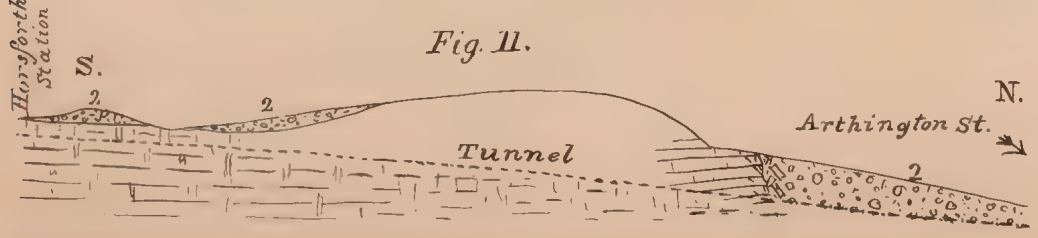

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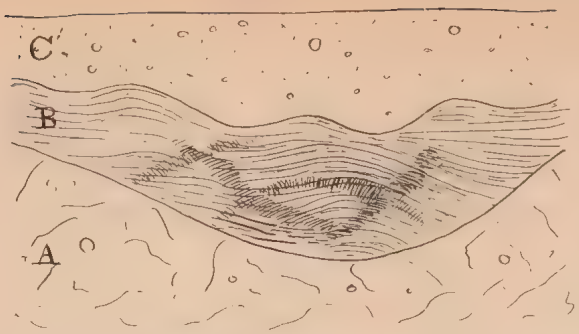

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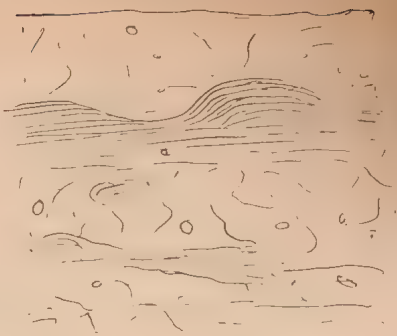

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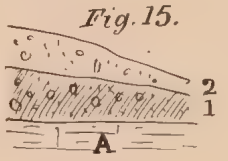

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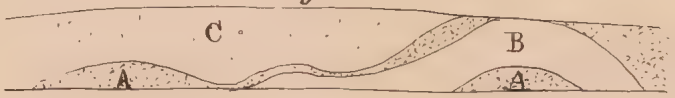

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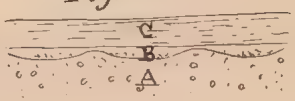

Fig. 19.

Fig. 20.

Fig. 21.

D. Fidler, Litho.

RING FOUND AT DRIFFIELD, YORKS. 1867.

AN ACCOUNT OF THE ANGLO-SAXON RING DISCOVERED NEAR DRIFFIELD, YORKS, NOW IN THE POSSESSION OF THE REV. GEO. WELBY, BARROWBY, GRANTHAM. BY THE REV. J. T. FOWLER, M.A., F.S.A., OF NORTH KELSEY.

This curiously-wrought and massive ring was discovered, as such things usually are, in an accidental and singular manner. A ploughman, feeling a slight obstruction to the progress of his ploughshare, found that it had entered the opening of a large finger-ring, which was soon ascertained to consist of pure gold, with patterns and inscriptions in embossed and enamelled work. Its weight is 1 oz. 3 dwts. 11 grs., or eight grains above the weight of four and a-half sovereigns. One-third of its circumference is formed by the bezel, which is circular, about seven-eighths of an inch in diameter, and appearing at first sight elliptical, from being curved in conformity with the rest of the ring. The designs on this portion have been worked on a separate plate, attached by four rivets. It has a central plain circular surface half an inch in diameter, in the midst of which is a small hole, partly, but not immediately, over one in the solid gold beneath. This seems as if the plate had sometime been off, and riveted on again not exactly in the right place, evidently by some hand less skilful than that which originally made the ring. The perforation has probably served for the insertion of a pin by which some ornament has been attached —probably, as we shall see, a representation of St. John the Baptist or of the Holy Lamb.

Round the plain circular space are four semilunar depressions which unite to form a quatrefoil; each of these is occupied by an ornament in relief, consisting of a stalk bent upon itself in the form of a figure of eight. Two of these terminate in lobed leaves of simple but elegant form, quite reminding one of twelfth or thirteenth century work. The

quatrefoil is enclosed in a plain circle so as to form four curvilinear triangles or spandrels, occupied by letters and marks, made by cutting away the metal so as to leave them level with the general surface, and filling up the space so obtained with dark bluish-grey enamel. This probably consists of lead and sulphur, as in some other enamelled rings of the same period. The outermost border of the bezel is a sort of chain of minute elliptical beads.

The rest of the ring is formed of a small circular compartment, having on either side of it an elongated hexagonal compartment, connected with the bezel by a grotesque mask of a beast's face, much resembling some that are seen on Norman corbels, &c. These masks are embossed, and very conventional in character; though much worn, they still show traces of markings in enamel, and seem to have had gems inserted by way of eyes. They are attached to the bezel by the tips of their ears, and to the rest by their noses. The circular and hexagonal compartments are enclosed and occupied in the same way as the spandrels already described. The inner surface of the ring is quite plain.

The inscription is in Roman letters, such as are found on stones, &c., of the seventh century, associated with Runic characters; notably on the celebrated Ruthwell cross, and upon a ring to be referred to presently.

It is simply the Baptist's exclamation—

+ ECCE AGNVS D⁻I

The first word is on the bezel, the cross and the first letter occupying the left-hand spandrel, and one of the remaining three letters, with some dots and marks, apparently ornamental, each of the others. The letters AG occupy the hexagonal compartment on the right of the bezel, NVS the circular space, and the D⁻I the remaining one. Here, again, are dots as in the spandrels, as if merely to fill up, and so avoid the unsightly appearance which too much of

the dark enamel would have presented. To speak now more particularly of the several characters: the initial cross is small in proportion, irregularly formed, and rather spread out at the ends. The A has two inclined strokes with the cross-line at the top. The C's are like E's without the central cross-mark. The N has its two side-marks almost close together, and its cross-mark not going from corner to corner, but from side to side, like an H with an oblique cross-mark. The V has a sort of elongation at the point, making it almost like a Y. The S is like a reversed Z, as usually at this time. The rest of the letters are ordinary Roman capitals, but the E in the last word is represented by a mark of abbreviation. These archaic Anglo-Roman letters, like Runes and other primitive characters, were, doubtless, made to consist almost entirely of straight lines for the sake of greater facility in carving, &c. The Runic alphabet used in the Manx inscriptions has only one letter containing a curved line, the *Thorn* or *th*.

A very similar gold ring was found, in 1773, at Llysfaen, Caernarvonshire. It is not known where it now is, but it is described in the fourth vol. of *Archæologia*. It has no bezel, but consists of four circular and as many lozenge-shaped compartments, each surrounded by a chain ornament, and occupied by enamel and letters in the same way as the Driffield ring. The inscription is the proper name + ALHSTAN, the cross and letters being in the circular compartments, two in each. The final letter is the Rune *nyd*, the rest are Roman letters, the S being a reversed Z.

Any attempt to discover the original owner of the Driffield ring must of necessity be based upon conjecture, for it bears no name, as this one does. But so fine and costly a specimen of goldsmith's work may well be supposed to have belonged to the royal family which owned Driffield in the 7th and 8th centuries, namely, that of Oswin, king of Northumbria-

Deira, comprehending Yorkshire and Durham. It had been the kingdom of Æthelwald, St. Oswald's son, from 650 to about 660, and then of Oswin's eldest son, Alhfrith, until 664, when there is reason to suppose he was one of the victims of the great pestilence.

Thenceforward, Deira and Bernicia (the district to the north of it) were united under one sceptre, wielded in succession by Oswin and his sons Ecgfrith and Aldfrith, the latter of whom, however, was only *said* to be his son *(dicebatur)*. During the reign of the last, we find the residence of the family at Driffield. Although neither of his contemporaries, the Ven. Bede, in his *Ecclesiastical History*, nor Eddi, in his *Life of St. Wilfrid*, mention the place of Aldfrith's death, and although the MSS. of the Saxon Chronicle are equally silent in this respect, a later MS. (Cotton Tiberius, B. iv.), amongst other notices, apparently derived from some lost Northumbrian chronicle of the eighth century, has this notice: "A.D. 705. Her Aldfrith Northanhymbra cyning forthferde xviiii kī Janr on Driffelda" [At this time Aldfrith king of Northumbria deceased on the 14th of December in Driffield]; valuable as specifying not only the place but the exact date of Aldfrith's death.

The ring may well have belonged to this family, and its peculiar device, different from that of every other known ring of Anglo-Saxon times, seems to point out that member of the family for whom it was originally made. The lost jewel or enamelled or embossed device of the *Agnus Dei*, or of St. John the Baptist with that symbol (perhaps shaken off by the ploughshare and still hidden in the field), and the legend *Ecce Agnus Dei*, indicate a special devotion on the part of its owner to the great precursor of Our Lord. Such a devotion is indicated in a very remarkable way on the two crosses which once formed the monument of Alhfrith, now at Bewcastle in Cumberland, and Ruthwell in Annandale.

On the western side of each of these the most conspicuous object is the image of St. John the Baptist pointing to the Lamb of God. That a prince so devout as Alhfrith was, and inspired as we may believe with this particular devotion, should have chosen this device and legend for his ring is by no means improbable; and so from him it may have passed to his brothers Ecgfrith and Aldfrith, for the appearance of the ring shows that it had been long in wear before it was lost. This is merely conjecture, and, however pleasing it may be to indulge herein, it must pass for no more than it is worth.

We have already referred to the very similar ring bearing the name Alhstan, on which account it may be attributed to Alhstan, Bishop of Sherborne, A.D. 817–867. Its character, however, which we have described above, is quite different from that of episcopal rings generally, which have a plain circlet and a precious stone in the bezel, and it would be difficult to account for the ring of a West Saxon bishop having been lost in Caernarvonshire.

May we not rather suppose it to have been part of the spoils carried away by the British king Cadwallo from Northumbria, during the wars of the seventh century? Such a supposition is confirmed by the fact that in design and workmanship it so closely resembles the Driffield ring that they might well be the work of the same hand, and there may be some connection between them.

We know that it was the custom in Anglo-Saxon families to give to the children names resembling each other in their initial or final elements. Thus we have—

(1.) Æthelstan, Æthelwulf, Æthelbald, Æthelberht, Æthelred, brothers of Ælfred the Great.

(2.) Eormenbeorh, Eormenburh, Eormengyth, Æthelthryth, Æthelred, Æthelberht, the children of Eormenred of Kent.

(3.) Oslac, Oslaf, Oswudu, brothers of SS. Oswald and Oswin.

And amongst the children of Oswin we have *Alhfrith*, *Alhflæd*, Ecgfrith, Aldfrith, Ælfwine, Ælfflæd.

Possibly *Alhstan* was a prince of this family who fell in the wars of Cadwallo, and thus may his ring have found its way into Wales, while that of his kinsman remained in Yorkshire until discovered a year or two ago.

This account must not be concluded without calling the attention of the members of the Society to the fact that, somewhere in our northern shires, although its present habitation is unknown, there recently existed a brooch of gold which there is reason to believe belonged to King Ælhfrith. It was seen by M. Worsaae, of Copenhagen, in 1847, and bore a Runic legend which may be thus expressed in roman letters:—

GUDRD MEC WORHTE ÆLCHFRITH MEC AH.

Gudred me wrought, Ælhfrith me owns.

Professor Stephens prints the legend from a note sent by the late Mr. Kemble to M. Worsaae.

Surely, if members of this Society make persevering enquiries amongst their friends, this precious relic, if still in existence, may yet come to light.

NOTICE OF THE DISCOVERY OF A PAIR OF ANCIENT SHOES AND A HUMAN SKELETON IN A PEAT MOSS ON AUSTWICK COMMON, NEAR CLAPHAM, YORKSHIRE. BY HENRY DENNY, A.L.S., OF LEEDS.

Amongst the various relics of the early inhabitants of this island which are preserved to modern times, none appear so rare as those appertaining to their wearing apparel. When we consider, however, the perishable materials of which they

were made, this circumstance does not excite our surprise; as these primitive people, like the Esquimaux and other northern nations of the present day, would depend almost entirely upon the produce of the chase, not only for food, but also for their simple garments and the materials to sew them together; and, although the tanning properties of the peat in which they were embedded would, in a great measure, preserve such articles for a very considerable period, still, to this there would be a limit, after which decomposition or decay would annihilate the entire mass—and hence the extreme rarity, not only of human remains, but also of the skin or woollen garments in which they were clothed.

Although several articles of primitive apparel have been exhumed in the Irish bogs, I am not aware of more than three instances where such remains have been found in England. It is, therefore, with much pleasure I bring before this Society a notice of a pair of primitive shoes and also a human skeleton, which were discovered in Yorkshire, and for the opportunity of recording these I am indebted to the kindness of James Farrer, Esq., of Ingleborough House.

On the 11th of July, 1846, while some labourers were digging peat upon Austwick Common, in the parish of Clapham, they discovered the remains of a human skeleton beneath four feet of peat, from which six feet had been previously removed, and also a pair of shoes; though not in close proximity, and, therefore, probably not belonging to the same individual. These latter are of tanned leather, and of the class which Sir Wm. Wilde calls single-piece shoe or buskin, with large flaps or latchets, which were drawn together by a strong leather thong passed through loops, to close over the instep. The upper leathers of the fronts have three gashes or slits, so as to resemble the sandals or shoes worn by the Italian peasants. They are of comparatively small size, and would be only what a shoemaker of the present

day would designate as *fives*. The single unions of the upper leathers are sewed in a remarkably neat manner, with fine strips of leather, or the dried intestines of some animal. The outer soles were fastened on by a number of round-headed nails, the whole of which have entirely disappeared, leaving only the apertures marked by the counter-sunk circles which the heads have left. These are arranged in a chain pattern down the centre of the soles, and a single row round the circumference. The inner sole of one is composed of two pieces of leather, apparently to economise material, and connected here and there by narrow strips of leather interlaced. The soles are not symmetrical, but slightly incurved, so as to present a remote resemblance to what are termed *rights* and *lefts*—which configuration is seen in Roman shoes, as also in the native manufactured sandals of some Indian tribes.

What the *age* of these shoes may be it is perhaps difficult to determine with any degree of certainty, and it is only by comparison we can arrive at a probable conjecture. The neatness of the one seam might suggest an idea that they cannot be very old. This circumstance, however, supplies no evidence whatever against their antiquity, as in portions of Egyptian garments taken from a mummy in the museum of the Leeds Philosophical Society, known to have been interred 1723 years before Christ, there occur not only *darns*, but *seams* of great neatness, which are now, therefore, above 3593 years old. In 1821, a human body, completely clad in a deer-skin garment, was found in a peat bog on the lands of Gallagh, near Castleblakeney, County of Galway, and the latter was for many years exhibited in the museum of the Royal Dublin Society, but of which only a few fragments now exist. In some of these, however, the seams by which it was originally drawn together still remain, and are remarkable, as Sir Wm. Wilde informs us, for their *neatness* and the *regularity* of the *stitches*, and which, singularly enough,

are of the kind called at the present day *looped* stitch, or *button-hole* stitch. The material employed for sewing was fine gut of three strands, an article still employed for the same purpose by many uncivilized nations.* The Roman shoes found in London, and figured by Roach Smith in his *Roman London*, exhibit a considerable amount of taste in their ornamentation, as well as neatness in sewing, so that we may infer care in the one case and variety of design in the other were as necessary to practise by the shoemakers of Roman times as those of the present, and that the occurrence of either is no proof of modern manufacture.

A very extensive and interesting collection of ancient shoes is preserved in the museum of the Royal Irish Academy, all of which have been obtained from the bogs of that country, and are ably described by Sir Wm. Wilde in his catalogue of the above Museum; but with none of these do our Yorkshire shoes exactly agree. Although I will not venture to declare they are Roman, yet, as they bear in many respects a closer resemblance to those of Roman manufacture than they do to those from the Irish bogs, especially the caliga worn by the military, there is a probability of their having been such. It may be well to draw attention to the general make of the former, of which there were five or six kinds: as the *caliga*, almost essentially a military shoe; the *crepida*, or civilian shoe; *calceus*, or close shoe; the *cothurni*, or boot; *socci*, or woman's loose kind of shoe; and the *campagi*, which, however, appears to have been of foreign origin.

Bruce, in his description of the Roman wall, relates that a considerable number of shoes were found September, 1852, in forts on the Roman wall, and their vicinity, at a depth of nearly seven feet, at Bremenium; and at Whiteley Castle, in the remains of a Roman dunghill, amongst other refuse, was found a large store of old shoes, or sandals; the soles were all

* Wilde's Catalogue, 276.

made right and left, and consisted of several folds of leather fastened together with round-headed nails. Both sandals and shoes were characterised by the number and size of the nails in the sole, which were frequently arranged in tasteful lines. The shoes had no heel, and the soles were double. The upper leathers were united between the upper and under portions of the soles before being nailed together. There was no sewing used excepting to unite the upper leathers in the front part of the foot, and this was done by a thin strip of leather, *not with thread* (pp. 326-443). Several were also found in digging the foundations of Carlisle gaol, which were of undoubted Roman manufacture.

In Roach Smith's *Illustrations of Roman London* are figures of Roman shoes found during excavations in various parts of the city, most of which were of small size, and probably belonging to women, young persons, and some to children. A few, from eleven to thirteen inches in length, are presumed to have been men's shoes; all, however, had been *nailed*. In the Free Public Museum at Liverpool is preserved a pair of Roman caliga found in a moss at a depth of eight feet, on the line of the Roman wall, near Port Carlisle, which differ from any of those found in London, approaching more to the calceus or perfect shoe, covering the heel and toes in close leather, but open down the front as far as the toes, with long narrow slashes cut on each side. Now, it is not a little singular that the following important characteristics, to which I have alluded in the make of Roman shoes, are also to be seen in those now under consideration:—

(1.) Roman shoes are invariably made right and left, and formed of one piece.

(2.) They were fastened in front by strong thongs through loops, to keep them tight across the instep, and the fronts were gashed both for ornament and ease, and the single union was sewn by a fine strip of leather or intestine of some animal.

(3.) The layers of the soles were almost invariably held together by round-headed nails, clenched inside.

(4.) The upper leathers were held in position by being enclosed between the two layers of the soles.

There is, therefore, at least a presumption in favour of my conjecture. But if so early a period is not accorded to them, they must have been worn in a very remote age, by a very primitive inhabitant of the Yorkshire moors.

While stating the points of resemblance between the Roman shoes and those found at Austwick, it is only fair to state also the one instance in which they differ. In all those previously alluded to of undoubted Roman manufacture the upper leathers were united by one seam either at the toe or heel; in our Yorkshire specimens the union is on the inner side, where the fronts generally join to the hind quarters. Whether this one peculiarity is an important feature, and adverse to my presumed conjecture, is open to proof by those fully conversant with the relics of ancient Rome.

The human skeleton found in the same locality and at the same period had two stones of calliard and grit stone, placed one at the head and the other at the foot, but there was no indication of a kist; so that it is evident the individual had not been accidentally lost in the bog, but carefully interred on this solitary spot. The relative size of the bones indicate the individual to have been of short stature, and that one of the clavicles had been fractured and united by natural restoration. It was pronounced to be the skeleton of a female; a point, however, which I think cannot be positively determined, as the pelvic bones are not complete. There are peculiarities connected with the skeleton which are somewhat unusual. The temporal, frontal, parietal, and occipital bones of the skull are all separated, as is usual in early life, while the epiphyses of the long bones are firmly united; a fact which militates against the supposition of immature

age. The most singular fact connected with the bones, which are excessively light, is that they have lost all their earthy material, probably owing to the action of some acid in the peat, and only retain their animal matter, and, from their curved appearance, I should infer, when first exhumed, were perfectly flexible. The single scapula preserved has a folded or partially doubled appearance, similar to what would be seen in a piece of wet parchment. The circumstance just alluded to respecting the state of the bones is very unusual with animal remains found imbedded in peat, which has the singular property of preserving such substances for an almost indefinite period before decomposition of the flesh or skin takes place, and then we generally find the bones sound and good, as is the case with the gigantic Irish deer, red deer, swine, ox, or bear in the Irish bogs—most of which must be of great age, from the situations in which they occur; as also those of the beaver, moose deer, and bear in England. When, however, a superabundance of acid is present in the peat, its peculiar action upon the bones is very remarkable. But the period required to produce this change is uncertain and unknown, and, therefore, for anything we know to the contrary, may be a very long one; supposing, however, that no change in the composition of the bones takes place until after the entire decomposition of the *flesh* has been effected, then the period of their entombment must have been very remote. In support of which I shall adduce a few instances of the exhumation of human remains from peat, where their preservation was most remarkable, though we have evidence of their great age. In the beginning of the last century the perfect body of a man in the ancient Saxon costume was discovered in peat at Hatfield Chase, in Yorkshire.*

In the *Philosophical Transactions* for 1734, there is a letter

* *Bakewell*, 451.

from Dr. Balgny, giving an account of the preservation of two human bodies in peat for fifty-nine years. "On January 14th, 1675, a farmer and his maidservant were crossing the peat moss above Hope, near Castleton, Derbyshire, when they were overtaken by a great fall of snow, and both perished; their bodies were not found till May 3rd in the same year, and, being then in a very offensive state, the coroner ordered them to be buried on the spot in the peat. The man's name was Carter. There they lay undisturbed twenty-eight years and nine months, when the curiosity of some countrymen induced them to open their graves; the bodies appeared quite fresh, the skin was fair and of its natural colour, and the flesh as soft as that of persons newly dead. They were afterwards frequently exposed as curiosities, until the year, 1716, when they were buried in Hope church, at the expense of Mr. Barber, of Rotherham, the man's grandson. At that period Dr. Bourne, of Chesterfield, who examined the bodies, says: 'The man was perfect, his beard was strong, the hair of his head was short, and his skin hard and of a tanned leather colour, like the liquor in which he was lying. The body of the woman was more injured, having been more frequently exposed; the hair was like that of a living person.' The Rev. Mr. Wormald, the minister of Hope, who was present when they were removed for interment, says: 'The man's legs, which had never before been uncovered, were quite fair when the stockings were drawn off, and the joints played freely without the least stiffness.'"* In June, 1749, the body of a woman was found six feet deep in a peat moor, in the Isle of Axholm, in Lincolnshire, the antique sandals on whose feet afforded evidence of her having been buried there for ages, yet her hair, nails, and skin are described as having shown hardly any marks of decay.† On May 1st, 1783, a

* *Bakewell*, 451.

† *Sigele*, vol. iii., p. 183.

human body was found on the Earl of Moira's estate, in Ireland, a foot deep in gravel, beneath eleven feet of peat. The body was completely clothed, and the garments appeared all to be made of hair. Although the body must have been interred at a very early period, yet it was fresh and unimpaired.* Sir Wm. Wilde records the discovery of a human body ten feet from the surface in a peat bog in County Galway, in 1821, which had the head, legs, and feet uncovered, but the body enveloped in a skin tunic, which reached the knees and elbows, and was laced in front by thongs of leather. It was six feet in height, and apparently of a person about thirty years of age, and when discovered had the *teeth*, long *dark hair*, and even the partially-grown beard perfect.†

In 1824, a male body completely clad in woollen garments of antique fashion was found in a bog, six feet beneath the surface, in the parish of Killeny, in the county of Sligo; no weapons were found with the body, but a long staff lay under it, and attached to the hand by a leather thong was said to have been a small bag of untanned leather containing a ball of worsted thread. The head-dress was a conical cap of sheepskin, and so perfect was the body when first discovered that a magistrate was called upon to hold an inquest on it.

In 1824, there was found in the peat, near Harald's Kjor, a female body in a mummified state, fastened by a hook to a stake, and covered with rich gold ornaments. This, according to the northern archæologists, was the body of Queen Gunhelde, who, in the year 965, had been sunk into a peat bog as a punishment for her infidelity to the king. Some bodies were also found dressed in skin with sandals on their feet, which testified to their antiquity.‡ Dr. Walker states that some bodies were dug up in Ards Moss, Ayrshire, which

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* Countess of Moira, *Archæologia*, vol. vii.

† Wilde's Catalogue, 277.

‡ *The Morgenblatt*, for January, 1858.

had lain ever since the persecution of the Covenanters in the reign of Charles II.* Although peat, as we have seen, will arrest decomposition for long periods, this property is also possessed by ice and mineral waters. Of the former, we have the instance of the frozen and entire bodies of the mammoth and rhinoceros, in Siberia. The following singular discovery was made more recently, in September, 1863:—

On the 14th of September, 1844, a young man of the village of Passy, between Chamouny and Sallanches, left his home on a pilgrimage to the Convent of St. Bernard. Such pilgrimages are common in these parts; the Augustine monks, who exercise the world-renowned hospitality of the old hotel-convent, being in the habit of sending annually messengers through the whole of Savoy and Switzerland to collect offerings for the maintenance of the Hospice, as well as to encourage visits to the shrine of St. Bernard. The chief period of these religious excursions is in the middle of September, when the roads are freest from snow and ice, and most of the villages in the mountains are enlivened by fairs, municipal processions, and other festive gatherings. The pilgrim of Passy, a robust young man, but lately married, and setting out on his journey in consequence of a vow made before gaining the belle of the village, quitted his home in the most joyous spirits, striding with elastic step, now through purple fields covered with rhododendrons, and then again up huge boulders of rock and across mighty glaciers, extending, like frozen rivers, down to the green valley of Chamouny. The people of the mountains do not like the beaten roads, along which eager tourists hurry in stage-coaches and on mules, but prefer the silent footpaths across the hills, mostly shorter than the highway, and always more beautiful. Thus the traveller from Passy, in going to the great St. Bernard, instead of proceeding up the famous passage by which the legions of Bonaparte went to Marengo, preferred walking across the spurs of the Aiguille d'Argentière, and from thence, by the Vallée des Morts, to the Hospice. He reached the convent safely on the evening of the day on which he started, was hospitably entertained at the Hotel de St. Louis, paid his devotion to the saint of the mountain, and on the following morning descended the path to Martigny, famous for its wine, its monks, and its gnats.

Martigny was not on the road of the pilgrim of Passy, and the object of his going there was a purely mercantile one. The annual fair, visited by dealers and manufacturers from all parts of Switzerland, was being

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* *Memoirs of the Anthropological Society*, vol. ii., p. 36.

held there, and it was in the plan of the traveller to buy a large piece of linen, and, by smuggling it across the Sardinian frontier, to reimburse himself for the expenses of the journey. There was nothing to prevent the execution of the scheme—a very common one among the peasants of the Savoy Alps. Accordingly, after having remained a night at Martigny, and driving as close a bargain as possible for his piece of linen, the pilgrim started on his journey early on the morning of the 16th September. To avoid the Custom-house, particularly strict on this part of the Sardinian territory, he had to take a rather difficult path across the Col de la Forclaz, frequented only by smugglers and chamois hunters, but, nevertheless, free from danger to an experienced mountaineer. Leaving the main road from Martigny to Chamouny to the left, he climbed the precipitous sides of the Col de Balme; then descended into the stony and desolate Alpine gorge, enclosed by thick pine forests, and traversed by the Eau-noire; then again mounted the snow-clad ridges of the Taunevergez, and, climbing higher and higher, at length reached the western slope of Le Buel, where ice fields, descending from the summit of Mont Blanc, marked the frontier between Switzerland and Sardinia — now between Switzerland and France. Here the young mountaineer was met by a peasant of the village of Sixt, to whom he gave news of the fair of Martigny. No human eye ever saw him alive after. Not coming home at the appointed time, he was sought for in all directions, but no trace of him could be discovered. For many a lonely night a young widow wept in her little cottage in the village of Passy, gradually solaced by the cries of a baby who had never seen his father, and after that the veil of time covered all. The mysterious disappearance of the pilgrim of Passy was forgotten, as most mysteries are forgotten in this fleeting world.

On the 7th of September, 1863, a shepherd of the village of Samoens went in search of a lost goat, which, in consequence of an uncommonly dry and warm summer, had strayed far up into the mountains overhanging the valley of the Dranse. Exploring the ice-bound ridges fruitlessly for a whole day, the man himself lost his way, and, seeing the sun sinking in the west, hurried home in what he believed to be the direction of his village, leaping from rock to rock with the help of his long alpenstock. Suddenly, on jumping across a deep glacier, an extraordinary sight arrested his eyes. The rays of the sinking sun illuminated a gulf of ice, looking like a vast crystal cavern, in the midst of which was the figure of a man lying flat on his back, with apparently open eyes and hands folded across his breast. Horrorstruck, the peasant nearly lost his footing, but, recovering himself, looked once more from the height of a detached rock into the crystal cave below. He had not been mistaken; there was the figure at the bottom, to all

appearance fast asleep, stretched out at his ease, and with a large parcel serving as a pillow under his head. The shepherd hallooed at the top of his voice, and then screamed; but not a voice answered from below. Fear now overcame him again, and with the strength of despair he continued his road across the rocks. Sooner than he thought, he arrived at the Chalet de la Gelaize, where he made known his discovery. It was too late to revisit the cave in the glaciers, but at break of dawn the next morning a party of mountaineers, guided by the shepherd, and provided with ropes and axes, set out for the spot. The crystal sarcophagus was soon found, and the boldest of the company was let down to the icy depths, from which he brought in his arms the body of a young man, frozen, and hard as stone, yet still looking fresh and life-like. Attached to the corpse by a mass of ice was a parcel containing a new piece of linen; while a watch, in the coat pocket of the dead man, with broken glass, but not otherwise damaged, showed the hour of noon. Two elderly peasants at once recognized the features as those of the pilgrim mysteriously lost nineteen years before. Embalmed in ice, decay had not yet touched his flesh, and he had lain undisturbed in his crystal coffin while a generation of men had passed away over his head. The discoverers of the body held a short consultation among themselves what to do with it, coming to the decision to carry their burthen at once over the mountains to Passy. There was no choice of conveyance, the only one being the *crochet* or hook fastened to the shoulders, on which all loads are transported in the Alps. To the hook, accordingly, the frozen corpse was fastened in a sitting posture, with upright head and feet hanging to the ground. Thus the pilgrim, dead nineteen years, was carried to his former home, through snowfields and glaciers, across rocks, fields, and meadows, extending over near a score miles. Fastened still to the *crochet*, the body of the young man was left at the cottage of the young widow of Passy—now young no more, but an elderly grey-haired woman. The son, who had never before seen his father, made him a wooden coffin, and, to honour his memory, kept the body lying in state for twenty-four hours. Then, at the ringing of bells, and accompanied by all the inhabitants of the village, the pilgrim was carried to his last resting place, never more to be disturbed by mortal hands.—*Courrier des Alpes.*

Of the power of mineral waters to arrest decomposition we find, in *The Morgenblatt* for January, 1858, the following singular instance:—

Affecting Recognition.—A few years ago, in working to establish a new communication between two shafts of a mine at Falkun, the capital of Dalecarlia, the body of a miner was discovered in a perfect

state of preservation, and impregnated with vitriolic water. It was quite soft, but hardened on being exposed to the air. No one could identify the body; it was merely remembered that the accident by which he had thus been buried in the bosom of the earth had taken place above fifty years ago. All inquiries about the name of the sufferer had already ceased, when a decrepit old woman of seventy, supported on crutches, slowly advanced towards the corpse, and knew it to be that of a young man to whom she had been promised in marriage more than half a century ago. She threw herself on the corpse, which had all the appearance of a bronze statue, bathed it with her tears, and fainted with joy at once more beholding the object of her affections. It is easier to conceive than trace the singular contrast afforded by that couple; the one buried above fifty years, still retaining the appearance of youth; while the other, weighed down by age, evinced all the fervency of youthful love.

The question of time during which animal remains may be preserved in peat will suggest another intimately connected with it—as to the period during which the peat has been forming, and which will not always be uniform, but depend materially upon the damp, humid nature of the soil, the plants growing there and annually adding to its depth, and also whether the moss has been originally a forest or always a swampy marsh, as the one will be of a firmer consistence, from the stems of trees intermixing with it, and the other soft and spongy, being composed almost entirely of bog moss and a few other aquatic plants, hence the depth as also the consistence of such peat bogs will differ very considerably. Familiar examples of the more spongy bogs may be seen in Chat Moss, in Lancashire, and Solway Moss, on the confines of Scotland and England, and of the more firm in Hatfield Chace. The depth of the former may be conjectured from the fact that at the Battle of Solway, in the reign of Henry VIII., 1542, when the Scotch army commanded by Oliver Sinclair was routed, an unfortunate troop of horse, driven by their fears, plunged into this morass, which instantly closed upon them. This tale was only traditional, but it is now considered as corroborated, as a man and horse in complete armour were

found by peat diggers in the place where it was always supposed the affair had happened. The skeleton of each was well preserved, and the different parts of the armour easily distinguished (*Lyell's Geology*, iii., p. 185). Sir C. Lyell says Hatfield Chace appears clearly to have been a forest 1800 years ago. Fir trees have been found there 90 feet long, and sold for masts and keels of ships; oaks have also been discovered there above 100 feet long. In Hatfield Moss, as well as that of Kinkardine and several others, Roman roads have been found, covered to the depth of eight feet by peat. All the axes, arms, and other utensils found in British and French mosses, are Roman; so that a considerable portion of the European peat bogs are evidently not more ancient than the age of Julius Cæsar. Nor can any vestiges of the ancient forests described by that general always on the line of the great Roman way in Britain be discovered, except in the ruined trunks of trees in peat; but, as he also observes, several of the British forests which are now mosses were cut at different periods by order of the English Parliament, because they harboured wolves and outlaws. Thus the Welsh woods were cut and burnt in the reign of Edward I., as were those of Ireland by Henry II., to prevent the natives from harbouring in them and harassing his troops (*Lyell*, iii., p. 181). Hence there will always be a difficulty in determining with certainty the antiquity of a peat bog, unless some definite articles are discovered which are unmistakeably of Roman, Saxon, or Mediæval manufacture.

In the present instance, we are not in possession of such materials, unless the shoes are allowed to be sufficient evidence on the one part. With regard to the human skeleton, which, as I have already stated, although found in the same moss, was not near to the shoes, and may, therefore, have been in no way connected with them, although very probably of early date, and several hundred years may have elapsed since its inter-

ment; as, at the period of their discovery, they were submitted to Professor Owen for examination, who stated that interment for one hundred years would give the bones the appearance they then presented, but that no after time would cause the slightest alteration, so long as they remained *in situ* or undisturbed, which, of course, must be received with certain limitations, for, however preservative the tanning properties of peat may be, decay must inevitably result, sooner or later, and eventually all traces will disappear for ever—even of the most enduring substances.

Whether, however, the specimens now before us can be traced back to Roman times or not, there can be no doubt they are of very early date, and, as they are very probably the only human relics exhumed from a peat moss in Yorkshire which have been preserved, the thanks of the Society are therefore due to Mr. Farrer, who, as Lord of the Manor, rescued them from destruction. To this gentleman's liberality and zeal, Archæologists are also largely indebted for his explorations of Maes-howe, and other sepulchral chambers in the Orkneys; the former of which contains the most extensive series of Runic inscriptions discovered in Great Britain.

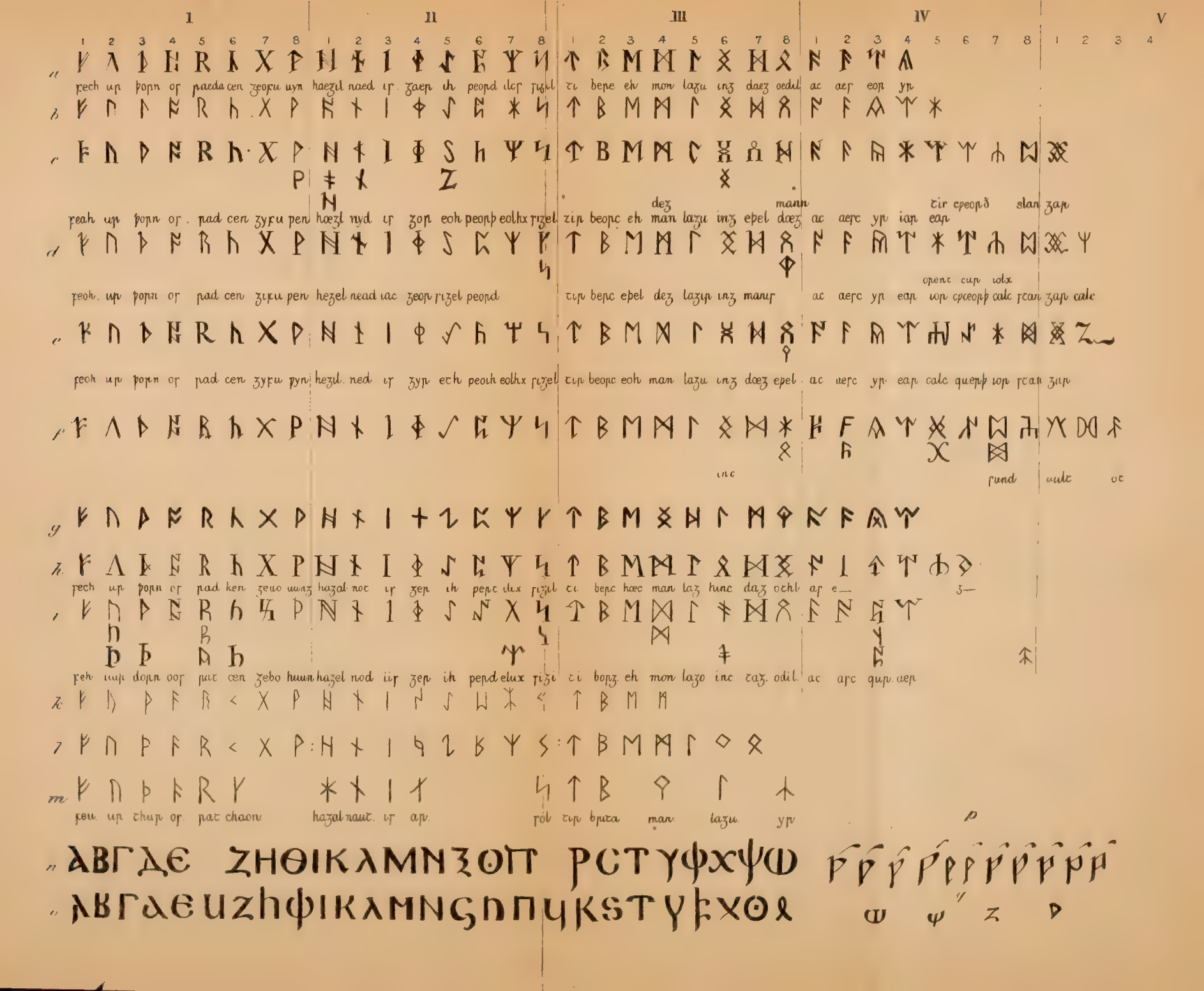
Finally, it may not be irrelevant to state that under very peculiar circumstances nearly all the animal substance disappears—that is to say, so far as relates to the human body—while the woollen clothing and wooden coffins remain in a comparatively perfect condition. Sir John Lubbock relates a most remarkable instance of this kind of the preservation of clothing, and the almost total disappearance of the bodies, in some interments during the bronze period, opened in 1851. On a farm occupied by M. Dahls, near Ribe, in Jutland, are four tumuli, known as Great Konglhoi, Little Konglhoi, Guldhoi, and Tremhoi. The last was exhumed in 1851, by MM. Worsaae and Herbst. In it, near the

centre, were found three wooden coffins, two of full size, and one evidently intended for a child. In one of the former, nine feet eight inches long, and two feet two inches broad outside, closed by a lid of corresponding size, the contents were peculiar and very interesting. While, as might naturally be expected, we find in most ancient graves only bones and teeth, all the soft parts having long ago decayed away, in some cases (and this was one of them) almost exactly the reverse had happened. Owing to the presence of water, and, perhaps, to the fact that it was strongly impregnated with iron, the soft parts had been turned into a dark, greasy substance (adipocere), and the bones, with the exception of a few fragments, were changed into a kind of powder. Singularly enough, the brain seems to have been the part which had undergone the least change. On opening the coffin it was found lying at one end, where, no doubt, the head had originally been placed, covered by a thick hemispherical woollen cap, about six inches in height. The outer side of the cap was thickly covered by short loose threads, every one of them ending in a small knot. The trunk of the corpse had been wrapped in a coarse woollen cloak, which was almost semi-circular, and hollowed out round the neck. It was three feet eight inches long, and broad in proportion. On the right side of the corpse was a box, closed by a lid, fastened together by pieces of osier or bark. In this box was a similar and smaller one, without a lid, containing a cap of simply woven stuff, a small comb, and a small simple razor-knife; the coffin also contained two woollen shawls, one of them covering the feet, the other lying higher up; they were square in shape, five feet long, three feet nine inches broad, with a long fringe. At the place where the body had lain was a shirt of woollen material, cut out for the neck. It was fastened at the waist by a long woollen band, which went twice round the body, and hung down in

front. On the left side of the corpse was a bronze sword, in a wooden sheath, two feet two inches in length, having a solid simple handle; at the feet were two pieces of woollen stuff, about fourteen and a-half inches long, by three and a-half inches wide, what may have been the remains of leggings. At the end of the coffin were found traces of leather, doubtless the remains of boots. In the cap, where the head had been, was some black hair, and the form of the brain was still recognizable. Finally, this ancient warrior had been wrapped round with an ox hide, and so committed to the grave.

THE RUNIC MONUMENTS OF NORTHUMBRIA. BY THE REV. DANIEL HENRY HAIGH, OF ERDINGTON.

Runes are a system of writing which the Jutes, the Angles, and the Saxons, our forefathers, brought with them to England in the 5th century; a system which they had preserved, in common with all the other branches of the great Teutonic stock, from times of very remote antiquity; a system perfectly distinct from the old Shemitic alphabet, which was the parent of the alphabets of Greece, and the abecedaria of Italy. The origin of this system must certainly be referred to very early prehistoric times; to times when nations who appear as perfectly distinct, each from the others, when the dawning light of history first breaks upon the darkness of northern antiquity—whose remains, disinterred from their tombs, show that even then they had been distinct for a period long enough to have established amongst them distinct manners, customs, and traditions of art—were one people, and spoke one language: for, whilst there are differences in the forms of some of the characters in the inscriptions which remain to us of different Teutonic nations—to say nothing of dialectic differences in the names of the characters as preserved


I
II
III
IV
V
a
feoh ur thorn os rad cen gyfu wyn
b
feh ur thorn os rad cen gyfu pen
c
feoh ur thorn os rad cen gyfu pen hæzl nyd is zor eoh peorþ eolhx sigel
d
feoh ur thorn os rad cen gyfu pen hezel nead iac zeor sigel peord
e
feoh ur thorn os rad cen gyfu pyn hezil ned is zyr ech peoh eolhx sigel
f
feh ur thorn os rad cen gyfu wynn hazal not is zer ih peorc eolx sigel
g
feh ur thorn os rad ken zebo wunn hazel nod iir zer ih peord elux sigil
k
feu ur thurs os rat chaon hazal naut is ar
a
ac aesc yr
b
ac aesc yr iar ear
c
ac aesc yr ear calc
d
ac aesc yr eah ior cweorþ calc stan
e
ac aesc yr eah calc
f
ac aesc yr eah ior cweorþ calc stan
g
ac arc gar aesc
m
ac asc gar aesc
a
ᚠᚢᚦᚩᚱᚳᚷᚹᚻᚾᛁᛄᛇᛈᛉᛊᛏᛒᛖᛗᛚᛝᛟᛞᚪᚫᚣᛡᛠ
b
ᚠᚢᚦᚩᚱᚳᚷᚹᚻᚾᛁᛄᛇᛈᛉᛊᛏᛒᛖᛗᛚᛝᛟᛞᚪᚫᚣᛡᛠ

to us on the authority of MSS. of later, but still very early times—we have evidence, not only manuscript, but monumental, that the order of this system of writing was the same in all. This order I have already given (in a communication which I had the honour of presenting to this Society in 1855), on the authority of a MS. of Northumbrian origin, and of the 8th century, which I now place first in the accompanying comparative table (Pl. I.) of the old futhorcs of our own forefathers, and of other Teutonic races. We call the system *futhorc*, as we call those of Greece and Italy *alphabet* and *abecedarium*, on account of the sequence of its first characters, a sequence which at once establishes its distinct nature, and indicates a distinct origin.

(*a.*) A MS. at Vienna, Salisb. 140. From the orthography of the names of the runes I have inferred, on a former occasion, that this MS. is of the 8th century, and of Northumbrian origin. I have since learned that W. Grimm regarded it as a transcript from one brought to Germany by a brother of Alcuine, Arno Bishop of Salzburg. He went from Northumbria in the latter half of the 8th century. This MS. gives twenty-eight characters, but differs from every other in the relative position of *yr* and *ear*.

(*b.*) A MS. at S. Gallen, No. 878, of the 9th century. It is called "Anguliscum," to distinguish it from an alphabet which precedes it (and which I shall notice in the sequel), and from the Scandinavian futhorc, which is there called "Abecidarium Nord." It gives twenty-nine characters, in what I regard as the correct order, but the 15th, as here represented, is indistinguishable from the 29th. Neither the names nor the powers of the characters are given.

(*c.*) MS. Cotton: Otho, B. 10. In this the names and powers of the characters are supplied, but a later hand has introduced corrections, and those incorrectly. Thus the 20th character is *man*, and every authority except MS. Domitian

A. 9 places *man* here; the corrector has written *deg*, and *d* over the true value, *m*. The 24th (in every other futhorc the 23rd) is *dæg*, as it should be; the corrector has written *mann*, and *m* over *d*. The scribe has given to *ior* the 28th place instead of the 29th, and to *ear* the 29th instead of the 28th; and the corrector has inserted *tir* as the name of the latter. Important variants of the 9th and 13th characters, derived from other futhorcs, are added.

(*d*.) MS. Domitian, A. 9. In this futhorc there are several errors, imputable to the scribe who has written the names of the characters. The 11th is called *iac* instead of *is;* the 13th *sigel* instead of *eoh;* the 15th is not named, nor is the 16th; the 19th is *ethel* instead of *eh;* the 20th *deg* instead of *man;* the 23rd *manis* instead of *deg;* and the 28th *tir* as well as *ear*, (as if the scribe of this MS. were the corrector of Otho, B. 10.); and, just as in that MS. *d* is written over *m*, and *m* over *d; iolx*, the name which is omitted over the 15th, is written over the 31st, which is really *calc*, and a rune resembling *iolx*, but with *calc* written over it, follows *gar*. The 16th rune differs from the usual form (which is written above it), and a variant of the 24th is added above the line. These are borrowed from another futhorc, to be noticed in the sequel. Over *ior* is written *orent*, and over *queorth*, *cur*.

(*e*.) MS. Cotton: Galba, A. 2. This seems to be a very correct copy, giving the names only of the runes. Some of the forms differ from the foregoing. The 14th seems to want a line at the top. The 20th occurs in inscriptions only as a form of the 23rd. The second form of the 24th is supported by the last cited MS., and by the other futhorc alluded to above. The 29th and 31st are made to change places. The 30th, which in the foregoing is hardly distinguishable from the 28th, has here a distinct form.

(*f*.) MS. S. John's, Oxford, No. 27. Here the names are not given. The order is correct as far as the 23rd character;

then *ior* is inserted before a character which resembles *oethel*, and the value *oe* assigned to it. The next four are in the usual sequence; then two characters resembling *gifu*, each with the value *g* in place of *ior;* then *querth*, *stan*, *calc*, *oethel* (of the usual form); then the rune which stands for *peorth* in the last cited futhorc, and four others. These are undoubtedly English, the two following I regard as of Continental origin.

(*h.*) MS. of Isidorus, at Brussels, 155. This much resembles (*a*), but the characters which represent *ing* and *oedil* are interchanged, and the names of the characters seem to belong to a Continental dialect. Unfortunately, this is imperfect at the end.

(*i.*) MS. at S. Gallen, 270. The characters which compose this futhorc occur as an alphabet in the MS. 878 above referred to, and, as that alphabet is followed by the futhorc (*b*), which for distinction is called "Anguliscum," it seems clear to me that this alphabet and the futhorc in 270 is something other than "Anguliscum;" that it belongs to some other branch of the Teutonic stock. A MS. at Munich, 14436, contains an alphabet arranged from the same futhorc, and from this and the alphabet in 878 we obtain invaluable assistance towards the illustration and correction of this futhorc.

(1). Both alphabets give the 3rd rune in the usual form with the name *dorn;* in the S. Gallen MS. it is followed by the 8th, *huun* (on account of the resemblance in form).

(2). The futhorc and the alphabets agree in the peculiar form of the 7th and 14th runes; the latter almost identical with the *queorth* of Galba, A. 2.

(3). The S. Gallen alphabet gives the 12th rune as a second form of *g;* the Munich has the usual form of *calc* with the name *ker* as a second form of *k*.

(4). Both alphabets give the 13th as a *k*, the latter with the name *ki*.

(5). The futhorc and S. Gallen alphabet agree as to the form of the 15th; the Munich alphabet gives to *elux* a form more nearly resembling the English.

(6). The futhorc gives to the 20th rune the form which in all inscriptions belongs to the 23rd. The S. Gallen alphabet happily corrects the error. The 20th is always *man*.

(7). The Munich alphabet gives the 22nd rune with the same name as in the futhorc.

(8). The S. Gallen alphabet gives the 24th as well as the 4th for *o;* the Munich alphabet gives the former alone.

(9). The futhorc seems to reverse the usual places of the 25th and 26th runes. The S. Gallen alphabet gives both for *a*, and the Munich alphabet calls the former *ac*, so that we may believe they really stood as in the English futhorc.

(10). The futhorc has for the 27th rune the name *yur*, but the value *q;* the Munich alphabet gives the correction *qur*. The S. Gallen alphabet gives the value *p* and another form of *q*. This will be explained when I come to speak of the names of the runes.

(11). The futhorc has *aer* for the name of the last rune; the Munich alphabet *ear* and the value *e*.

(12). The Munich alphabet gives another form for *calc*.

We may then correct the futhorc as in the second line, and we observe that the number of runes is twenty-nine, and the variations from the English futhorc six.

The three following from monuments I notice here only for the sake of comparison with the foregoing.

(*g*.) A futhorc on the blade of a knife, or *scramasax*, found in the Thames, consisting of twenty-eight runes, in the same order as in (*a*), save that the 20th to the 23rd are transposed. The 16th and 24th runes show the origin of the variants in Domitian, A. 9., and the 12th and 27th are curious varieties.

(*k*.) A brooch, found at Charnay, in Burgundy, presents twenty runes in order, and inscriptions which help to supply

what is wanting. In these twenty we observe six variations from the English futhorc.

(*l.*) A golden bracteate, found at Wadstena, in Sweden, presents twenty-three characters, in the usual order, save that the 23rd is omitted. The 9th shows the origin of one of the variants in Cotton, Otho, B. 10., and besides this there are seven variations from the English futhorc. This is peculiarly valuable, inasmuch as it arranges the runes in divisions of eight each.

(*m.*) The most ancient copy we possess of the Norse futhorc, is from the S. Gallen MS., 878, accompanied by the following verses:—

Feu forman	Feu first,
Ur after	Ur after,
Thur is thritto stabu	Thur is third stave,
Os ist thimo oboro	Os is next to that,
Rat end *os* uuritan	Rat and Os written
Chaon thanne chumet	Chaon then cometh
Hagal naut habet	Hagal Naut hath
Is ar endi *sol*	Is, Ar, and Sol
(Tir) birca endi *man*	(Tir), Birca, and Man
Lago the leohto	Lago the light
Yr al bihabendi	Yr all ending.

Over several of these runes are written their correspondents in the usual futhorc, and below the word *feu* is WREATH in runes, which I think is represented in our old English glossary by *wræth* "pecus," the equivalent of *feu*. In this abbreviated futhorc we observe that the first six runes are in the same order as the foregoing; the next five correspond to the 9th, 10th, 11th, 12th, and 16th; and the last five to the 17th, 18th, 20th, 21st, and 27th.

With this exception, all the copies of the futhorc agree as to the sequence of most of the characters. As far as the 29th there can be little doubt but that it was as in (*b*). Several English authorities extend this system to thirty-three, and

one to forty distinct characters; and it is probable that the latter was the original number, for we have evidence that it was divided into classes, each of eight characters; and, as these were regulated by the sacred number eight, we may well believe that another sacred number, forty, determined the extent of the futhorc, and completed the 5th class. (I shall henceforth, for convenience, speak of each rune by the number of its class and its position therein.)

This evidence is furnished by the Wadstena bracteate, on which the futhorc is divided into eights; and by the S. Gallen MS., which mentions several varieties of secret runes,—viz., *Iis-runa*, which were simple repetitions of the rune *Iis;* the number of short strokes in each group denoting the class to which the character intended belonged, and that of the longer ones its position in the class; *Lago-runa*, differing only in the use of *Lago* for *Iis; Hahal-runa*, consisting of branching stems in which the branches to the left denoted the class, and those to the right the ordinal rank of the letter; and *Stof-runa*, in which the class is denoted by dots, placed above others which indicate the ranks. As an example, the word CORVI is given in each kind of writing, and it appears that C *(Cen)* is I. 6, O *(Odil)* III. 8, R *(Rat)* I. 5, V *(Uur)* I. 2, and I *(Iis)* II. 3.

This notice, therefore, of secret runes, vindicates the order of the futhorc as far as the 24th character, and reveals the fact that its division into classes of eight characters each was fully recognized in Germany.

In England, at Hackness, in Yorkshire, one example of inscription in *Hahal-runa* exists, but it is unfortunately too much defaced to be read satisfactorily. In Scandinavia, where the futhorc was reduced to sixteen runes, examples of *Hahal* and of *Iis-rune* are found, and Liljegren, in his notice of this kind of writing, says that the futhorc consisted of three divisions, *Fe* heading the first, *Hagl* the second, and

Tir the third; and that the classes to which the runes belonged, and their places therein, were denoted in the same way as in Germany and in England. So, though the number of characters was abridged, those which were retained had the same position in their respective classes as in the original system; *Yr* only excepted, which was removed from the 4th to the 3rd class. This kind of writing, in use amongst distinct and remote peoples of the Teutonic race, clearly indicates the order and arrangement of the futhorc; and as it is possible that inscriptions of this kind more perfect than that at Hackness may yet be discovered, the length to which I have gone in the assertion of these facts may be excused. Each character of the futhorc was distinguished by a sound expressive of some object, and instances are not infrequent in old English MSS. of the use of the symbol for the word which designated it. This nomenclature prevailed, as far as we know, amongst all the Teutonic nations.

The Cotton MS. Otho., B. 10, now unfortunately lost, contained a poem explanatory of the names of the old English runes, and a similar explanation of those of the Norse runes is contained in a MS. at Copenhagen. These explanations cannot be relied on in every instance; difference of opinion appears to have existed with regard to the meaning of some of the names; and, perhaps, when a word was susceptible of more than one meaning, the author of the poem chose that which best suited his fancy.

I.—(1.) *Feoh;* it is explained as "money," *(pecunia);* its earlier sense was "cattle," *(pecus);* its primary perhaps an "ox."

(2.) *Ur;* a "wild bull."

(3.) *Thorn;* a "thorn tree." In the Norse poem we have *thurs,* "a giant;" and we have also the variations *dour* and *thur,* a "door." This last I prefer.

(4.) *Os;* a "mouth." The Norse poem explains it as a "door" or "entrance." There is no such word for "mouth"

in the old English language, the correspondent of the Latin *os oris* being *or*, but with a limited application. The real meaning of *ós*, the only one it has in old English, must be a "hero."

(5.) *Rad;* a "saddle."

(6.) *Cæn;* in the poem it is a "log" of wood on the fire; in the Exeter Book the meaning "bold" is attached to it; in the Norse poem it is an "ulcer."

(7.) *Gifu;* a "gift."

(8.) *Wen;* "hope." In the Exeter Book it is *wæn*, a "wain;" the Vienna MS. gives *wyn*, the "vine," "wine," or "joy." I see no reason to retract my opinion with regard to this character and 5, that each is the symbol of a head, this of youth, that of age, and hence the abstract ideas *wen* "hope," *ræd* "counsel."

II.—(1.) *Hægl;* "hail." I believe that the character symbolizes an "enclosure," and that this is the meaning of the word.

(2.) *Nyd;* "necessity." The original meaning was perhaps a "bond" or "knot." For it was an old Teutonic custom, when a man espoused a woman, to write this rune on her nail, and we still speak of tying the marriage knot. The form of the rune may be the symbol of a knot, the secondary meaning would easily follow.

(3.) *Is;* "ice." I believe it is rather *is*, *isen*, "iron."

(4.) *Gear;* "year." The Norse futhorc has *ar* with the same sense; and here we have one instance of the name keeping its place in the system, though both the form and the value were changed.

(5.) *Eoh;* interpreted "yew" tree, but that would be *eow* or *iw*. All authorities agree in giving *h* as the final letter. It is very possible that its meaning was nearly the same as the following, which in the S. Gallen futhorc has nearly the same form; old English *eoh* a "horse."

(6.) *Peorth;* in the poem a "chess pawn" is certainly intended, but the Icelandic *ped*, Italian *pedone*, and Persian *piadeh* all want the *r*. I take it to be another word for a "horse," Mod. Germ. *pferd;* Holl. *peerd;* Lat. *veredus* (from the Celtic).

(7.) *Eolhx;* "sedge." The old English supplies *eoloc* a "reed," *eolh*, *elch* an "elk," and *eluh* "myrrh." I prefer the second.

(8.) *Sigil;* in the old English poem explained as if it were *segel*, a "sail," in the Norse poem *sol*, the "sun." I cannot help thinking that it was originally the symbol of a "serpent."

III.—(1.) *Tir;* explained in the old English poem as a "constellation always visible and moving at night," *i.e.*, certainly six stars of Ceorl's or Woden's wain, lines connecting which would give the form of this character. I think, however, it must be an "arrow."

(2.) *Beorc;* a "birch" tree. Originally, I think, *berg*, a "hill" or "fortress."

(3.) *Eh;* a "horse." Rather *éh*, the "sea" or "water."

(4.) *Man;* a "man." The Norse *madr* is the same. The resemblance between this rune and *dæg* suggests that it may have been also a symbol of a measure of time, a "moon" or "month."

(5.) *Lagu;* "water." The character seems to be intended for a whip, the symbol of *lagu*, "law."

(6.) *Ing;* instead of explaining this word, the author of the poem has favoured us with a valuable notice of a hero of this name. The resemblance of this symbol to *oethel* suggests that its meaning may be a "field," for which *ing* remains in provincial use. This will explain the interchange of these two symbols in the futhorc (*h.*)

(7.) *Dæg;* a "day."

(8.) *Oethel;* "patrimonial land." It is the symbol of an enclosure.

IV.—(1.) *A'c;* an "oak" tree.

(2.) *Æsc;* an "ash" tree.

(3.) *Yr;* a "bow."

(4.) *Ear;* spoken of in the poem as an instrument of death, perhaps *earh*, or *arwe* an "arrow."

(5.) *Ior;* said to be a "waterfish," but our glossaries give no such word. This is the last word explained in the poem. MS. Domitian, A. 9, has an explanation *or ent*, the "primæval giant."

(6.) *Queorth.* This is a strange word, apparently formed on the model of *peorth*, and the S. Gallen futhorc (*i*) gives to this character the form which *peorth* has in our own. But that futhore gives us also the rune *yur* for *qur* (as the Munich alphabet and the value *q* show that it should be), and over this character in Domitian, A. 9, the word *cur* is written. Now, *kurra* is the word for a "horse" in the Assyrian inscriptions, a word not Shemitic, but borrowed from the old Accadian language, and the late Dr. Hincks remarked the traces of its root in the Latin *currere currus cursus*, and in the Teutonic *hors*. I believe, then, that *queorth* or *cur* is, equally with *peorth* and *eoh*, the symbol of a horse.

(7.) *Calc;* I believe this rune is the symbol of a "thunderbolt."

(8.) *Stan;* there can be no doubt that this means "tin," Lat: *stannum*, since a pig of tin preserved in the Truro Museum is not only stamped with this symbol, but bears its form.

V.—(1.) *Gar.*

(2, 3, 4.) Names unknown.

(5.) *Vult;* in that part of the Dialogue of Salomon and Saturn which speaks of the mystical properties of the letters which compose the Lord's Prayer, a rune is mentioned, immediately after *dæg*, which can only correspond to *v* in *adveniat.* Its form is not given, but instead thereof the

word *fy'r*. This must be the rune intended, and *vult* "fire" is probably the lost root of the old English *wuldor*, Goth. *wulthus*. Of the other runes of this division the names are unknown, but neither they nor the foregoing have yet appeared on monuments.

The futhorc I have placed at the head of the list is certainly of Northumbrian origin; the five following are preserved in MSS. written in the south of England, and the names of the runes belong to a southern dialect, yet the runes are such as were used in Northumbria from the 7th until the 10th century, and seem to have been peculiar to the Angle kingdoms. We have traces of the use of other futhorcs in other districts and by other tribes, but with the exception of the Thames knife, (if that be English, and not Frank) none so complete as these.

Now these futhorcs approve themselves as indigenous to our language by their capability of expressing sounds which the Roman abecedarium does not. The uncertainty of English orthography, the confusion of sounds attached to different letters, and the irregular pronunciation of our modern language, are all attributable to the circumstance that our forefathers accepted from the missionaries of the Christian faith an abecedarium by no means suited to their tongue in place of their old futhorc. Long ago the fact, that at least nine letters are required, besides those we have, in order that each may express a single determinate sound, was observed by Mr. Sheridan, whose scheme of the sounds which our language embraces is nearly as follows :—

15 vowels.....

a^1	a^2	a^3	a^4	e^1	e^2	i^1	i^2
hat,	hate,	hall,	harm,	bet,	beet,	bit,	bite.
o^1	o^2	o^3	u^1	u^2	w		y
not,	note,	noon,	cut,	cube,	short oo,		short ee.

20 consonants.
- labials—eb, ev, ep, ef.
- dentals—ed, edh, et, eth, es, esh, ez, ezh.
- palatals—eg, ek, el, er.
- nasals—em, en, eng.
- aspirate—h.

Three compounds—j = edzh, ch = etsh, and x = eks.

Two of our letters superfluous, viz.,—c = ek or es, and q = ek before u.

Regarding *x* also as superfluous—according to this scheme thirty-seven characters would be required to express the sounds of our language, and besides these, the promoters of the present phonetic movement rightly require two more to express the vowels in *put* and *now*. That the futhorc actually expressed nearly every one of these sounds we may well believe, since, as far as our knowledge of its powers extends, we find that it included many which the abecedarium does not.

The names of the runes themselves, their occurrence in ancient inscriptions, and a comparison of the words in which they occur, with the same words in their modern form, are, of course, our only criteria as to their value, and these are not always certain, since words might be differently pronounced, as the runes would have different powers, amongst different tribes. The Northumbrian inscriptions, few as they are, have supplied twenty-six runes, and amongst them nearly all the vowels, which may be arranged as follows:—

IV. (2.)—*Asc*, "ash," a^1.

IV. (1.)—*Ac*, "oak," a^3 or o^2.

IV. (4.)—*Ear*, ——, a^4. It occurs in the words *feārran*, and *heāfunæs*, at Ruthwell.

III. (3.)—*Eoh* or *eh*, —— e^1.

III. (8.)—*Oethel*, e^2. It occurs in the word *gidréfid* at Ruthwell, but at Falstone it is expressed by *e*, and seems scarcely to differ from the last.

II. (3.)—*Is*, i^1. The long i^2 is expressed at Ruthwell by II.

II. (5.)—*Ih*, i^2. That this was sometimes long i^2 is proved by its occurrence in the name *Gislheard* on a tombstone at Dover. This, however, is not Northumbrian. At Ruthwell it makes a diphthong with III. 3 in *ælmeittig*. In the word *drigith*, on a casket in the British Museum, it cannot be long. It has not yet been found on any monument to justify the value *eo*, derived from *eoh*.

I. (4.)—*Os*, o^1.

I. (2.)—*Ur*, u^1.

I. (8.)—*Wen*, w.

IV. (3.)—*Yr*, probably u^2.

II. (4.)—*Gear*, "year," y consonant.

II. (7.)—*Ilcs* was also a vowel, but it has not yet occurred in a Northumbrian inscription. Notwithstanding the vowels in the name *eolhx* I think it must have had an *a* sound in the southern kingdoms, as Professor Stephens has clearly shown that it had in Scandinavia.

Thus we have thirteen runes for the seventeen vowel sounds, and in the three first divisions of the futhorc we have fifteen of the twenty consonants, and the unknown characters of the 5th division may well be believed to have represented the rest. So the futhorc was perfectly adapted for the expression of our language, and as being so presents the strongest evidence of its indigenous origin. Had it been retained, the advocates of phonetic orthography would have been spared the trouble of inventing their alphabet of thirty-nine characters.

The influence of the missionaries of the Christian faith was strenuously and successfully exerted to substitute their abecedarium for the old futhorc, and in the earliest MS. monuments of our language Latin letters alone appear. Yet it was not long before the inadequacy of the letters *u* and *d* to express the sounds of the runes *wen* and *thorn* demanded imperatively their restoration; and, although the incon-

venience of double letters *ng, st, ae, ea, eo, oe,* for sounds which the older system would have expressed by single ones was tolerated, these two resumed and maintained their ground until long after the Norman conquest. This phenomenon is now recognized as evidence that the system to which they belong was one which our forefathers possessed, before they became acquainted with Latin writing and learning; and if it be so, one of exactly the same kind indicates the existence of futhorcs amongst other Teutonic nations in Continental Europe.

Born, A.D. 318, in the land of the Goths (trans Danubium), of Cappadocian parents (carried captive thither), sent on an embassy to Constantinople, and consecrated bishop A.D. 348, Wulfila devoted himself to the conversion of that people, and, as a means thereto, translated the sacred Scriptures into their language. There does not seem to be a reasonable doubt that his version is preserved to us, in part at least, in the Codex Argenteus, at Upsala, and the Wolfenbuttel and Milan palimpsests, although these are supposed to have been written at least a century later than his death, and in Italy. However this may be, it is certain that the writing of the Codex Argenteus was formed upon a Greek model, and the alphabet is proved, by the numerical values of the characters, to have followed the order of the Greek, rather than that of the Latin. I give for comparison (Pl. I. *n.* & *o.*), a Greek alphabet taken from a MS. of the 5th century, and the Gothic alphabet from the Codex Argenteus. The characters for 90 and 900, as in Greek, are used only as numerals, so that the alphabet really consists of twenty-five characters. Of these

B, G, E, Z, I, K, L, M, N, P, T, CH, have forms similar to the Greek, and the same values.

A, D, TH, R, S, F, O, have the same values as the Greek, but different forms.

W has the same form nearly as its Greek correspondent, but a different value.

Q, H, J (Y), U, HW, have different forms and values.

W corresponds to the Teutonic *wen*, a sound which the Greek alphabet had not; R, F, and O are already familiar runes; Q and U we have in the S. Gallen futhorc, and in the so-called Marcomannic alphabet; S and J we have on some Scandinavian monuments; and HW on a spear from Muncheberg, in Brandenburg. Besides B and I, then, which are common to the Greek and Runic systems, we have eight characters in this alphabet which are certainly runes (in a rounded form), and A, D, and TH, may be presumed to be derived from a futhorc now lost. It is true that R and S resemble their Latin correspondents; but this alphabet is so manifestly formed on the Greek model, that I cannot believe in any other than a Gothic origin for the characters which are not Greek. To my mind they are the remains of an old futhorc which this alphabet supplanted.

Again, the fragment of Hildebrand's lay, written in the 8th or 9th century, in the very heart of Germany, (most probably in the monastery of Fulda, in Hesse), in a dialect which may be considered Frankish, but with many features of resemblance to the old high German, contains, in its fifty-three lines, forty-one recurrences of the rune *wen*, (see some of its varieties in Pl. I. *p.*), five of the Latin *uu* instead of it, and one of *u* (which also is used for *f*); and the Weissenbrun hymn, in twenty-one short lines, four times expresses the syllable *ga* by the rune *ior*. The force of these facts cannot be denied. These runes are relics of a system which preceded the abecedarium, in use among the tribes who occupied Hesse and Franconia in the 8th century.

There is also another very important fact bearing on the subject which must not be passed over. Gregory of Tours says of Chilperic, King of the Franks of Soissons, A.D. 561

to 584: "He added also letters to our letters, *i.e.*, *ω* as the Greeks have it, *æ*, *the*, *uui*, of which we have underwritten the form (see Pl. I., *q*), and sent letters to all the cities of the kingdom that boys should be thus taught, and that books written in old times should be erased with pumice and re-written."

By "our letters" Gregory certainly means those of the abecedarium, and the letters added thereto by Chilperic were as certainly intended to convey Teutonic sounds for which the abecedarium had no adequate expression. Of these sounds, the futhorc does supply representatives, and we may be assured that Chilperic's letters resembled their correspondents in the old futhorc of his people, just as the characters which express the sounds *w* and *th*, added to the abecedarium in England, resemble the runes *wen* and *thorn*.

The new characters are given with much variety in different MSS., but we may believe that the Cambrai MS., which is of the middle of the 7th century, gives them (see Pl. I., 9) most nearly as Gregory wrote them; and we may recognize in the first, as he tells us, the Greek *omega*, intended to supply the place of the rune *othil;* in the second we have undoubtedly II. 7 of the futhorc, which had certainly an *a* sound; the fourth is intended for the rune *wen;* the third, expressing the sound of *thorn*, is of a form difficult to be accounted for, but perhaps a long down stroke on the left hand has been omitted, which would give nearly our MS. form.

The fact which this passage reveals, that there existed at the time books written of old, is of great importance; for those books could not have been written in Latin. If they had, there would have been no occasion to erase the writing in them, and write them again with the addition of characters which do not belong to the Latin system. They must have been written in the language of the Franks, and in Teutonic characters; they were to be re-written in the same language,

but in Roman characters; and these additional signs were to be employed for the expression of vocal sounds which the abecedarium could not supply. Had books of the period been preserved, doubtless we should have had examples in abundance of what we observe in our MSS. and in the alphabet of Wulfila, some Theodisc characters occurring amongst Latin or Greek letters; but Chilperic's work was an unavailing attempt to arrest the progress of Latin literature, a surrender of the old system of writing, for the sake of preserving the purity of the language. The first part of his instructions, which related to the erasure of the old writing may well have been complied with; but perhaps there was not sufficient interest felt to secure the transcription of the books generally into Latin characters, and so Latin literature advanced, and in the end prevailed, to the utter extinction of the primitive Frankish tongue. The old books of the Franks are lost for ever; their only memorial is in this passage of Gregory of Tours; the only relics of the futhorc in Frankish literature are those we have noticed in Hildebrand's lay, and the Weissenbrun hymn. Yet these precious monuments would of themselves have been sufficient to prove that the Franks had a futhorc before they adopted the abecedarium.

We have, indeed, a contemporary notice of the Runic as a recognized system of writing in the works of Venantius Fortunatus, in the beginning of the 7th century. It is certainly of some Teutonic race he speaks whenever he uses the word *barbarus*, for it is always in concord with Teutonic words, such as *leudus* a "song," *harpa* a "harp," or where Germany is his subject. Writing then to his friend Flavus, complaining of his neglect, he playfully suggests a variety of expedients to take away all excuse for his not writing. If it were distasteful to him to write in the Roman character he might choose the Hebrew letters, the Achæmenian signs, or the Barbaric rune; and if paper were scarce, beech bark

might supply for it, or ashen tablets might be used for the rune. It is clear that the Barbaric (*i.e.*, Theodisc) rune was as much a recognized system of writing as the Latin, the Hebrew, or the Persian cuneiform, at the close of the 6th century; and we are now in a position to assert that each family of the Teutonic race was in possession of its own futhorc; and that these futhorcs differed each from the other in the forms of some of their runes, as does the Gothic from the English, yet presented so strong a resemblance as to establish the certainty that they were derived from a common original in times of very remote antiquity. For this we have the authority of monuments, few, indeed, but sufficient for our purpose, discovered from time to time in different parts of Germany during the last thirty years.

Of these I will say nothing further now. My concern, at present, is with the Runic inscriptions of our own Northumbria, in which more monuments have been preserved, inscribed with these old characters, than in all England besides, and in which it is probable that many more may remain unnoticed, or buried, yet to be brought to light. When my attention was first directed to this subject, the crosses at Bewcastle, in Cumberland; Ruthwell, in Dumfriesshire; and Lancaster; the font at Bridekirk, in Cumberland; two gravestones at Hartlepool, in Durham; some letters on the coffin of S. Cuthbert; and a ring or two, were all that had been noticed. A double inscription at Falstone, in Northumberland, and some single (*i.e.*, purely Runic) ones at Leeds, Collingham, and Bingley, came under my own observation, or were communicated to me, and the three first of these were in part the subject of my former communication to this Society. Since then Mr. Franks, of the British Museum, most fortunately acquired in Paris portions of a very interesting casket of whalebone, of Northumbrian origin; Mr. Dotchon, of Whitby, has found a comb in a kitchen-midden there; excavations at

Wearmouth have brought to light a monumental stone; and Mr. Fowler, of Winterton, Lincolnshire, has discovered another built into the walls of the church at Crowle, in that county; all inscribed with runes. On some of these I wish to offer a few remarks, supplementary to my former communication. But, first, I would wish to draw the attention of the members of this Society to a most interesting relic of the past—indeed, one of historical importance, if it has been correctly described—which must be hidden in the cabinets of some one of our north country gentlemen, who, doubtless, would have pleasure in making it, as it deserves to be, known, if aware of its value.

When Professor Worsaae, of Copenhagen, visited England in 1847, a gentleman in the north, whose name he has forgotten, showed him an ancient brooch, inscribed with two lines of runes. Of these he sent a copy to the late J. M. Kemble, Esq., who, in a letter still extant, proposed the following restoration and reading:—

GUDRD MEC WORH(T) "Gudr(e)d me wrought,
E ALCHFRITH MEC A(H) "Alchfrith me owns;"

suggesting that the character of the brooch might afford a criterion as to the probability of its having been the personal ornament of King Alchfrith, the eldest son and associate of Oswiu, whose last appearance in our history was at the synod of Whitby, A.D. 664, and who probably was one of the victims of the pestilence of that year.

I take this opportunity of calling attention to a relic, which, if it be not what Mr. Kemble suggested, is remarkable on palæographical and orthographical grounds also, and, therefore, deserves to be better known; and, should this notice meet the eye of its possessor, or be the means of its discovery by some member of this Society, I should highly esteem the privilege of an opportunity of personally examining it, or the

favour of an impression in gutta percha of the runes, which will most probably be found on the back of the ornament.

Until this be discovered, the earliest Northumbrian Runic monument to which a date can be assigned, is a fragment of a cross at Collingham. I visited Collingham in January, 1855, for the purpose of examining the crosses there, of which I had heard something, but not at all expecting to find an inscription. To my surprise I read quite plainly on the front of one of these the name AUSWINI, and, on examining the left-hand side, the word ÆFTÆR not quite so plainly. My time being limited, I contented myself with taking rubbings, and giving my earliest attention to the study of these. After my return, I perceived that these inscriptions could not be complete, that there was space for one letter at least after *æftær;* that *Auswini*, a name in the nominative or accusative, could not depend on *æftær*, which would require a dative, and that there were traces of letters after it. A photograph, by Mr. Stansfeld, seemed to show traces of letters in another line; and clay impressions, afterwards procured for me by Mr. Denny, gave me here and there a letter of a two-line inscription on each of the other sides. At the commencement I supplied the name ŒDILBLÆD, because it seemed to agree with the traces that remained of the letters. This, of course, was conjectural, for nothing in history could suggest the name, so as to set fancy to work to find something one might have wished to find; but I am sorry to observe in the Report of the Proceedings of the Society, 1856–7, that this name is given in Pl. 3, as if I had clearly read it (quite inconsistently with the text at p. 513), and the more so because I have not preserved the tracings I made from the cast. On the left-hand side I found, as I thought, traces of G at the end of the first line, and of N—F——B at intervals in the second. On the front I thought I could trace a second line faintly and read every letter. On the

right-hand side the only letter in which I could feel any confidence was an S at the beginning of the second line. These traces, faint though they were, were enough to indicate something like the usual formula of Northumbrian epitaphs of the 7th and 8th centuries; but all that was of any consequence to me was the fact that this was a monument of King Oswini.

I should not have referred to this again, but for the notice of my reading which has appeared in Professor Stephens' great work on "Old Northern Runic Monuments," grounded on information supplied by Mr. Denny, (for himself and Messrs. Eamonson and O'Callaghan). Mr. Denny has kindly procured for me casts of all the four sides. From these I have taken other casts, so as to give in relief whatever traces of inscription there may be; from these light rubbings, and from these, again, tracings, which (reversed) enable me to present to the Society the remains of the inscriptions with restoration in dotted lines. My former readings were taken from clay moulds of the stone itself.

When I first saw these fragments, they had been for about fourteen years set up in the Vicarage garden, since their disinterment from near the foundations of the church, in 1841. The lower part had a coating of moss (the growth of these years), which was cleared away to allow of the moulds being taken for me, and thus the surface of the stone was again exposed to the weather. The consequence has been, as Mr. Denny can testify, that the traces of letters are not nearly so plain on the casts of 1870 as on those of 1855, for the surface of the stone has suffered from the exposure during this interval.

1. The cast of the back seems to show that the moss has not been quite cleared away, and the middle of the surface is most worn, being half-an-inch lower than the sides, (unless this be attributable to the warping of the mould), otherwise we might find the letters more distinct than they now appear.

The first character is a +, then the rune Œ. From the remains of the next character I should think it has been O; the next, which I formerly read L, and which I thought an I might precede, I now see is N. The next is B (on the upright stroke of this, and below, are two lines of accidental marks where I imagine a spade struck the stone twice whilst it was in the ground). The letters LÆD do not seem so plain to me now as in 1855, but the traces of inscription agree with those letters; and instead of ŒDILBLÆD I now read ŒONBLÆD. I believe the second line has been THIS SETTÆ, but the traces of the letters are very faint.

2. The first word is ÆFTER (not ÆFTÆR as I formerly read it); the stone has received a blow which has injured the surface between E and R. After the R I still see the G faintly on the casts and photographs. In the second line I see faint traces of the letter which I read F beneath the T of the first, but it may have been B; then indents corresponding to the upper part of the M. On one of the photographs taken in 1855, I fancy I can see the B.

3. The first letter is certainly A, the second U; (the cast shows the two downstrokes distinctly, and I have a vivid recollection of this letter as it appeared to me on the stone before I read the first). The third is S, but between these two letters the stone has suffered an injury which has broken away the surface, as shown in the tracing; it is not, however, as deep as the strokes of the letters, and appears but partially in my rubbing. The letters WINI follow; the cross-stroke of the N reaches to the first I and nearly to the second. Another injury to the stone below the cross-stroke has chipped away the surface so as almost to give to this letter the character of TH. After these is a K (*calc*). In the second line I still see the traces of YNING, and I believe that my restoration of the remainder was correct, both of this and of

4. The fourth side, in which I see RS at the commencement of the second line. Of this side I do not think a tracing necessary. Now these casts have revealed to me a fact for which I was quite unprepared. I could never understand how a part of the inscription was comparatively plain, and the rest very faint, until I noticed inequalities which led me to apply a rule to the surface. I then saw that it must have been reduced by rubbing, fully an eighth of an inch to the right of the name *Auswini*, and considerably more below; the same inequalities appear in the left and right faces; the back, as I have said, is lowest in the middle, and I imagine that the hostility to which Oswini fell a victim, pursued his memory after death, and occasioned the obliteration of his title, and of those parts of the inscription which would have identified him and the person who set up the monument. To this cause also may be attributed the defacement of the sculpture in the panel above the commencement of the inscription. Probably it contained the effigy of the murdered king.

The orthography of the names *Æonblæd* and *Auswini* differs remarkably from that which was usual at a later time. Ven. Bæda calls the queen of Oswiu *Æanflæd;* the occurrence of *oe* instead of *ae* has its parallel in the Falstone inscription to be noticed in the sequel, that of *o* for *a* may be compared with *Æodbald* for *Eadbald*, and *b* for *f* with *Ælbflæd* for *Ælfflæd*. In the Gothic of Wulfila, *au* is constantly used for *o*, as it is here in *Auswini* for *Oswini*.

That this monument was set up in memory of Oswini no one can doubt, and the name which I now find at the commencement of its inscription is the very name which I ought to have looked for at first; since—as we are informed by Ven. Bæda that *Æanflæd*, the daughter of *Ædwini*, the queen of *Oswiu*, obtained from her husband a grant of the land on which Oswini was slain, and thereon caused a monastery to be built, in which prayers should be daily offered up to Almighty

God for the souls of both kings, the murdered and the murderer—she would assuredly be the person who set up his memorial cross. I am satisfied that this name is there, and therefore think it probable that GISIBÆ rather than GINIFÆ followed ÆFTER, and that the restoration of the whole should be—

+ŒONBLÆD THIS SETTÆ	Æonblæd this set
ÆFTER GISIBÆ	After (her) cousin
YMB AUSWINI CYNING	After Oswini (the) king
GICEGÆTH THÆR SAWLE	Pray for the soul.

The fact of the name of Oswini being found here, even without hers, is enough to justify us in identifying Collingham as the site of the monastery which she built to atone for his murder, and so throws light on a point of Ven. Bæda's geography which previously was involved in obscurity.

Oswini, we are told, unable to contend successfully with Oswiu, dismissed his forces, and commanded his men to return home, "from the place which is called *Wilfaræsdun, i.e.*, Wilfara's Hill, and is about ten miles distant from the village *Cataracton*, against the north-west (*contra solstitiatem occasum*), and he withdrew with one only soldier, most faithful to himself, named Tondheri, to be hidden in the house of Earl Hunwald, whom also he esteemed to be most friendly to himself. But, alas! it was far otherwise, for Oswiu, by the hands of his præfect, Æthilwini, slew him, with his soldier aforesaid, betrayed by the same earl, by a death to be detested by all men. And this was done xiii. Kal. September, in the ninth year of his reign, in the place which is called *In Gætlingum*, where afterwards a monastery was built to atone for this crime."

The name *In Gætlingum* (the preposition *in* with the dative plural of a tribe-name), means "in" or "among the Gætlingas." Such local designations were not unusual; other

instances supplied by Ven. Bæda are—*In Berecingum* (Barking), *In Cuneningum* (Cunningham), *In Feppingum* (probably for *In Reppingum*, Repton), *In Hrypum* (Ripon, Latinised by Eddi *In Hrypis*), *In Undalum* (Oundle). The analogy of *In Cuneningum*, Cunningham (*Cuneningaham*, "the home of the Cuneningas"), shows how *In Gætlingum* might be also called *Gætlingaham;* and the natural tendency of a consonant to assimilate itself to, or be absorbed by, a consonant following,* and the occasional interchange of consonants of the same class,† explain the transition of this name to Collingham. The place is not noticed in the Domesday Survey. Destroyed, as were all the northern monasteries at the time of the Danish invasion, this probably remained waste until after the Norman conquest. The church is dedicated to the memory of S. Oswald, the elder brother of Oswiu.

In Domesday Book, Gilling near Richmond, and Gilling near Helmsley, appear as *Ghellinge*. The former has been identified with *In Gætlingum*, on account of its vicinity to Catterick. As Ven. Bæda was indebted for the materials of his precious "Ecclesiastical History" to the oral or epistolary communications of others, and as the former would be in English usually, I have thought that he may have mistaken Catterick for Kettering, in Northamptonshire, as there is no place bearing a name at all resembling *Wilaræsdun* in the neighbourhood of the former, whilst there is a Wilbarston to the north-north-west of the latter, distant seven miles in a direct line, and about nine miles by the nearest road. Northamptonshire was a part of the dominions of Oswini,

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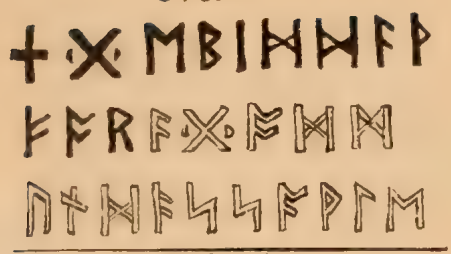
* Take the following examples of names of places in Domesday, compared with their modern names:—Bardulbi, Barlby; Bodelton, Bolton; Gedlingesmore, Gillamoor; Middeltun, Melton; Nadfartun, Nafferton; Redlintun, Rillington, &c.

† Thus Gherisintun and Godegrave of the Domesday Record are now Carsington and Cotgrave.

and the coincidence in the names, the distance, and the direction, (although this last should be west-north-west to correspond to *contra solstitiatem occasum*), is certainly remarkable. But I observe that, whereas Ven. Bæda elsewhere calls Catterick on the Swale *Cataracta*, and Simeon of Durham *Cataracta, Cateracta, Ceteracte*, the place named in this story is *Cataracton*, (*Cataractone* in the ablative); and, although this approaches more nearly to the Greek and Roman names of Catterick (Κατουῤῥακτόνιον, *Cataractonion*), I think it possible that confusion may have arisen in another way; that his informant may have spoken of the place which is now called Catterton, under the name of *Cataractun*, or something like it. There is the same difficulty about *Wilfaræsdun* in this case, as in that of Catterick; within ten miles to the west-north-west there is no name at all resembling it, nor fortified hill (*dun*), which may be supposed to have once borne this name, except the Castle-hill of Spofforth (which, of course, derives its name from the ford or passage of the river Crimple, and must have had some name peculiar to itself). But the name of *Wilfara* occurs in *Wilfrey Well*, rather more than ten miles to the west-south-west, and this suggests the possibility that his *dun* may have been the remarkable Castle-hill above the village of Bardsey. The distance is nine miles in a direct line from *Catterton;* the direction is *contra solstitiatem occasum*, if the winter solstice be implied; and Ven. Bæda does occasionally use *solstitium* for the winter, as well as for the summer, solstice; although, assuredly, in another place *solstitialis occasus* is the "summer sunset," opposed to *brumalis occubitus*. The possibility of some ambiguity in the information he received, (on account of the use of this word *solstitialis*), is evident.

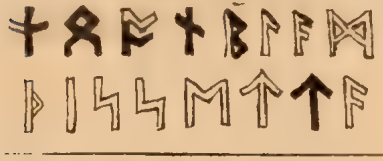
Apart from this, whilst this identification has scarcely so much to recommend it as the former, on account of the similarity of names,—(what it loses in the uncertainty that the

Irton



Collingham

1



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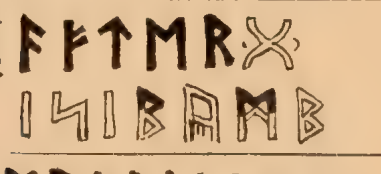

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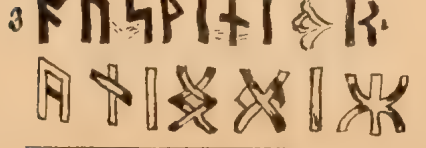
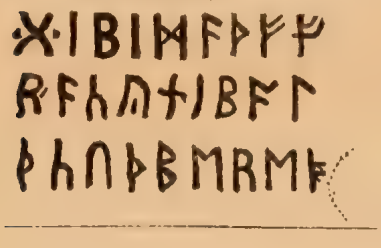
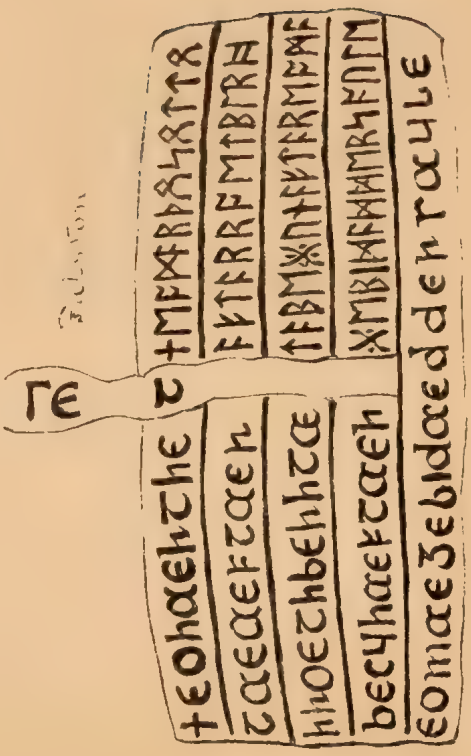


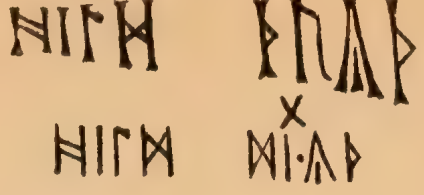
Lancaster



Ruthwell



Hartlepool



Bingley

THE SHADED RUNES DENOTE THOSE WHICH ARE DISTINCT
THOSE IN OUTLINE ONLY THOSE WHICH ARE INDISTINCT.

dun near Wilfrey well was ever *Wilfara's*, it gains in the resemblance between *Cataracton* and *Catterton*),—the proximity of these places to Collingham is certainly in its favour. Possibly old deeds may have preserved the peculiar names of the Castle-hills near Spofforth and Bardsey; they may even live yet in local tradition.

It is now fifteen years since I was led to visit Bingley, by information, supplied by the late Mr. Ainley, of that town, that its church contained a font with an inscription in what he supposed to be Runic characters. I found that they were, indeed, runes, but so much defaced, that patient study, and more time than I could command, were needed to read the inscription on the spot. Six characters, however, I could distinctly read; at the beginning of the first line, a cross and the rune *ear;* at the end of the second, the runes *nyd*, *yr*, and *sigil;* and at the beginning of the third, *os*. I took a squeeze in gutta percha, but, owing to the difficulty of manipulating so large a surface in the open air on a cold January day, this was very imperfect, and the only satisfaction I derived on my return home was the being able to read at the end of the second line and the beginning of the third, NYSODE ONGEN, "visited again," which strongly excited my curiosity, showing me, as it did, that this inscription was not an ordinary memorial formula, but must either be a passage from Holy Scripture, (I thought of St. Luke i. 68), or a historical record. With this, however, I was obliged to be satisfied at the time.

Having undertaken a journey to Ruthwell, in 1863, for the purpose of taking casts of the inscriptions on its cross, by way of contribution to my friend Professor Stephens' work on our "Old Northern Runic Monuments," I visited Bingley again, and took good casts in plaster, which I forwarded to Copenhagen, along with those from Ruthwell and Irton. The Ruthwell casts reached their destination

safely, the Bingley and Irton casts were broken on the way. Here was another disappointment. Still I was convinced that the Bingley inscription could be read, and looked forward to a time when I might be able to take another cast. During the last winter, the zeal of the Rev. J. T. Fowler placed in my hands a cast, a photograph of the cast, and a photograph of a rubbing from the stone. With these materials I returned to the charge, and succeeded in deciphering the whole inscription, as follows; and Mr. Fowler, who had independently made out some of the letters, tells me that in less than half an hour from the receipt of my reading he succeeded in verifying nearly every character; in fact, I believe the only character in which he was unable to follow me was the fourth from the end, which I had thought was Æ *(æsc)*, but which I now think may be as he reads it EA *(ear)*.

+ EADBERHTEATTINGCY
+ Eadberht Eatting cy-
NINGREHTEGEBANŒSTENYS
ning rehte geban œste nys-
ODEONGENBINGALEAHES + ∴
ode ongen Bingaleahes +

"Eadberht, son of Eatta, King, uttered a gracious ban, visited again Bingley."

I do not think that this inscription is complete. I think I can see traces of another line; and the imperfect character of the scrolls or knots on the other three sides convinces me that this stone has been split from its bed, which possibly may be still in existence; for the depth of the trough, scarcely ten inches, and its length and breadth, averaging about fifteen inches, are inconsistent with the idea that it can have been a font, in the eighth century, when baptism was administered by immersion. It has been originally the

socket in which a cross once stood, as broad as those at Bewcastle and Ruthwell; I believe it has been afterwards used as a water-trough, for which purpose a drainage hole was made in the right hand corner at the back, (had it been a font, this hole would have been in the centre of the bottom); then for many years it was used as a step for the entrance of the school, on the rebuilding of which it was brought to the churchyard, where I saw it in 1855; eventually it found shelter in the church. Its inscription, then, would seem to have been part of a record of some political transactions of especial interest—perhaps some grant of privileges to the people of Bingley, as the inscription on the cross of S. Paulinus, at Dewsbury, was a record of his apostolic labours there. This inscription at Bingley was on the base of the cross or pillar, not on the shaft, as in other instances.

The history of Eadberht is briefly as follows :—

A.D. 737. He received the kingdom of the Northumbrians, on the retirement of his cousin Ceolwulf to a monastery.

740. Whilst he was engaged with his army in a war with Talorgan, king of the Picts, Æthelbald, king of Mercia, invaded and ravaged his kingdom.

750. Cuthred, king of the West Saxons, declared war against Æthelbald, and Oengus, king of the Picts, who in this year succeeded Talorgan. This was espousing the quarrel of Eadberht, who was thus enabled to add to his dominions the plain of Kyle, in Ayrshire, with other districts.

756. He and Oengus, now confederate, took from the Britons the town of Alcluid (Dumbarton), on 1st August. On the 10th of the same month, the army which he had led from "Ouoma to Niwanbyrig" almost entirely perished. "All adversaries being either reduced to subjection or vanquished in war, the kings who dwelt on every side,

of Angles, Picts, Britons, Scots, not only kept peace with him, but even rejoiced to pay him honour; and the fame of his excellence and of his deeds of valour, diffused far and wide, came even to Pipin, king of France, wherefore, united to him in friendship, he sent to him many and different royal gifts." (Simeon Dunelm.)

758. He resigned the sceptre to his son Oswulf, received the tonsure from his brother, Archbishop Egberht, and became a Canon of York.

768. He died, and was buried at York in the same porticus as his brother, who had died two years before.

Ouoma, in Simeon's notice, seems to be the name of the place in his own dominions where he assembled his army; *Niwanbyrig*, *i.e*, "the new city," the name of the place whither he had led them in the territory of Oengus. Had this occurred independently of its present context, I should have supposed the latter to have been Newbury, adjoining Scarborough, and so called to distinguish it from the old town on the rock; it is now the name of the principal street there. But from the context I am obliged to look for it in Pictland, and identify it with Newburgh, in Aberdeenshire. I can find but one place in Eadberht's dominions with a name at all resembling Ouoma, and that is Hewenden (*m* before *d* becoming *n*). It is the name of a *dene* or valley, about three miles from Bingley, and *Ouoma* may have been the name of the neighbouring heights, on which is a circular encampment called Castle Stead Ring. If this were the place indicated, its central position perhaps marked it as suitable for the meeting of the forces of what are now the counties of Yorkshire and Lancashire, both part of the great kingdom of Eadberht; and such an occasion as this might well be that of his visit to Bingley.

The latest inscription of historic interest, in these old runes of our forefathers, is that upon a fragment of one of

the crosses found during the course of the demolition of the old parish church at Leeds. Having had the opportunity, since I last called the attention of the Society to this subject, of studying the history of the Danish kings of Northumbria to greater advantage, by the aid of the Irish annals, I now subjoin a series of notices, derived from those annals and our own English Chronicle, of the Onlafs or the Olafs who were connected with the history of Northumbria in the ninth and tenth centuries, that my readers may be able to judge for themselves to which of these kings the inscription in question may with most probability be supposed to refer.

I. Olaf, son of a king of Denmark, with his brothers, Sitric and Ivar, came to Ireland in the year 853, and was accepted as king by all the foreigners there, and he is noticed in the years 859, 861, 863, 869. In 863, he and Ivar and Uisli are named together as the three chieftains of the foreigners in Ireland. In 866, "Amlaiph and Auisle went to Fortren, with all the foreigners of Ireland and Scotland, and spoiled all the Picts, and brought all the hostages with them." Immediately before the notice of the death of Ælle, at York, in 867, the Annals of Ulster record the death of Uisli by the hands of his brethren; and, as this is omitted in the Annals of the Four Masters, (which seldom mention events that occurred out of Ireland), it is probable that Olaf was in England at the time, as Ivar certainly was. In 869, he was in Ireland, and burned Armagh. In 870, the Annals of Inisfallen tell us that Amhlaoimh and Iomhair "were gone with a fleet of 200 ships to assist the Danes of Britain, with their Danish leaders, Hingar and Hubba;" and this, doubtless, was the "great summer army" which came to Reading, as the English Chronicle records, to reinforce the Danes after the battle of Merton. In the same year Olaf and Ivar besieged Alcluid (Dumbarton), for four months, and destroyed it. This was after the conclusion of the war in

Wessex. In 871, they returned to Dublin with much plunder, and many captives, Angles, Britons, and Picts.

This Olaf, king of the Norsemen in Ireland, is named no more in the Irish Annals, as he would have been if he had died in Ireland. He probably went again to England and died there before 873, for he was king of all the Norsemen in Ireland, and Ivar always appears as second to him when both are mentioned together; but in 873, the Annals of Ulster and of the Four Masters record the death of "Iomar, king of the Northmen of Ireland and Britain," so that before that date he had succeeded to the sovereignty; and his successors appear to have been, in Ireland, his son Barid, who died in 881, and in England Halfdene, who was slain in 877.

II. Olaf, son of Guthfrith. Guthfrith became king of the Norsemen in Ireland on the departure of Sitric for Northumberland, in 920-1. On the death of Sitric, in 927, he left Dublin, went to Northumbria, was expelled by Æthelstan, and returned to Dublin after an absence of six months. His name occurs in the Irish Annals in 929, 930, and 931, and his death is recorded in 934. Olaf, his son, is mentioned as plundering Armagh in 933. In the next notice, which is of the year 937, he has the title "lord of the foreigners," showing that he had succeeded his father: "Amhlaoib mac Gofradh, lord of the foreigners, came from At Cliat (Dublin) at Lammas, and carried off Amlaoib Cendcairech from Lough Rib (Ree), and the foreigners who were with him, after breaking up their ships. The foreigners of At Cliat left their fortress, and went to England."

The sequel of his enterprize is told in our Chronicle, and in the Annals of Clonmacnoise. He suffered disastrous defeat at the hands of Æthelstan on the field of Brunanburh. His return to Dublin the Irish Annals record in 938, and his departure thence in 939. As he died out of Ireland, his

death does not appear in the Annals of the Four Masters, nor in those of Ulster, but it is recorded in those of Clonmacnoise, and in the Chronicum Scotorum of Duald Mac Firbis. It occurred in 941, and Simeon of Durham, and Roger of Howden tell us under what circumstances.

"Olilaph ('Onlaph,' R.H.) ravaged the church of S. Balter and burned Tiningham, and perished immediately."

This was the end of Olaf, son of Guthfrith. His last two years had been probably spent in piracy. He was succeeded in Dublin by his cousin,

III. Olaf, son of Sitric, sometimes called Olaf Cuaran, *i.e.* "the crooked." From the Annals of Clonmacnoise and of the Four Masters, we learn that Amlaoib Cuaran went to York in 940, and was succeeded in Dublin by Blacaire, son of Guthfrith, and the latter annals immediately afterwards record "a victory gained by the king of the Saxons over Constantine mac Aed, Anlaf (or Amlaoib) mac Sitric and the Britons." In 940 he came to York, and was chosen king by the Northumbrian Danes; thence, going southward, he besieged Northampton without success; he probably raised the siege on hearing of the approach of Eric, son of Harold Haarfager, whom he encountered and slew; and this must have been at Tamworth, where, our Chronicle says, he gained a great victory and much booty. Thence he went to Leicester, where he was attacked by Eadmund (this is the battle mentioned by the Four Masters). After a fierce battle, peace was made by the intervention of the Archbishops of Canterbury and York, and Olaf was baptized and received by Eadmund from the font.

In 941, after his notice of the death of Olaf, son of Guthfrith, Simeon of Durham continues: "but Onlaf, son of Sihtric, reigned over the Northumbrians." In 943, "Anlaf son of Syhtric," according to our Chronicles, was expelled by Eadmund, and Simeon of Durham mentions a second

expulsion in 945. In the same year, the Irish Annals record the expulsion of Blacaire from Dublin, and the succession of Amlaib Cuaran; and in 946 and 947 he is noticed again. In 948, Blacaire takes his place in Dublin, and our Chronicles say, "Anlaf Cwiran came to Northumberland." In 951, he was driven out by the Northumbrians, and Eric, son of Harold Blaatand, chosen in his stead. In our Chronicles he is mentioned no more; in the Irish Annals, as Amlaib Cuaran, he appears in 953 and 970, as Amlaoib mac Sitriocc in 964, 977, and 981, as Amlaoib, simply, in 962, 967, 969, 978, and 980, and as Amlaoib mac Gofrad (evidently a mistake) in 956. The notice of the year 981 is very interesting: "Amlaoib, son of Siotriocc, chief lord of the foreigners of At Cliat, went to I (Iona) on his pilgrimage, and he died there after penance and a good life."

Here, then, we have three Olafs, all kings of the Danes of Ireland, all connected with the history of Britain; the first, an invader of Britain in 866-7, and 870-1, probably died in Britain before 873; the second led an expedition to England in 937, returned immediately to Ireland, and, after two years there, departed, and died at Tiningham in 941; the third reigned in Dublin for a year, in Northumbria for three years more (940 to 943), recovered his kingdom and was driven out again in 945, reigned again in Northumbria from 948 to 951, and thenceforward in Dublin until 980, when he retired to Iona, and there ended his life. It does not appear that the second ever reigned in Northumbria, and the scene of his death is so remote from Leeds, that his claim to this monument may be at once dismissed. It cannot be, as I once supposed, a monument of the third, for he died at Iona; but it may have been erected by him to the memory of a friend or relative, and the Annals of Clonmacnoise record the death, in war with Eadmund, of a king of the Danes at York, who

can have been no other than this Olaf's cousin, Reginald, son of Guthfrith. This was in 944, and would be a very probable occasion for the erection of such a monument by Olaf. This Olaf, too, was certainly a Christian.

Hitherto I have never considered the question whether this cross could have been the monument of the first Olaf. That he died in England is extremely probable; and, as his name never appears in our chronicles, which only record the movements of the army—(from York to Nottingham, in 868; from York again through Lincolnshire into East Anglia, in 869; to Essex, in 870; to London, in 871; to Lincolnshire, in 872; to Mercia, in 873; one division to Cambridge, the other to Northumbria, in 874), in which he took part only in 870—it is more probable that he died in Northumbria than in any southern province. In my "Essay on the Coins of the Danish Kings of Northumberland," I have shown that none of the other Danish leaders (Bagsecg, Halfdene, Ingwar or Ivar, Ubba, Godrum, Oskitel, Amund, Eowisl), could have remained in Northumbria during these six years, for every one but Eowisl, (slain in 867), is mentioned in the story of their ravages of the Southumbrian provinces; and I have suggested that Deira was under the government of an Angle, tributary to the Danes, during this period, (as we know that Bernicia was), and that this was Barnred, of whom a single coin is extant. He need not, of course, be supposed to have reigned during the whole of the time; he might be superseded by Olaf, or expelled, as Ecgberht, King of Bernicia, and Wulfhere, Archbishop of York, were in 872. We have no evidence that he was a Christian, but he had reigned in Ireland for eighteen years previous to 871, and so had had opportunities of intercourse with Christians, which his brethren in England had not. It is quite possible, then, that this may be his monument. Whether it be so, or a monument erected to the memory

of Reginald, son of Guthfrith, by Anlaf, son of Sitric, I leave to the judgment of my readers.

There is one circumstance, hitherto not taken into account, which determines my own. I have said, "so remarkable a collection of fragments of sepulchral monuments of different dates indicate the existence, in early times, of a considerable religious establishment on the site of the Parish Church, at Leeds;" and I have shown the probability that this was the monastery founded by Mailoc, the brother of S. Gildas, in the fifth century, the "monastery of the venerable Abbot Thrydwulf, in Elmete Wood," mentioned by Ven. Bæda, the monastery in which Archbishop Eanbald died, in 796. Now, we are expressly informed, that all the monasteries of Northumbria, without exception, were destroyed, (this, therefore, at Leeds, amongst the rest), by Halfdene and his followers in 874, and none restored till after the Norman conquest. There was no revolution but this which could have destroyed so many sepulchral crosses and an altar, and converted them into mere building materials; and, satisfied for my own part that their destruction must be referred to the time of Halfdene, I can only regard the inscription on this fragment as a memorial of the first Olaf.

The inscription as it stands in Mr. Chantrell's drawing is, CUNI /// ONLAF. When the fragment can be examined by an experienced eye, I suspect that the second character will prove to be Y. The fifth, which is lost, was almost certainly NG. I supply these restorations in dotted lines.

The tombstones at Hartlepool bear respectively the names of HILDITHRYTH and HILDDIGYTH; the larger having, besides, A & ω above the arms of the cross. These have been the subject of a memoir presented to the Archæological Association in 1845, and of another published by Mr. Procter, of Hartlepool, in 1855, and I

refer to them on this occasion only on account of the probability that the larger one has a peculiar historical interest of its own. That part of the cemetery of the old monastery of Herutæu, which was opened in 1833, contained the tombstone of Breguswith, the mother of S. Hild. It was, therefore, in use in her time, and the stones then discovered are of her time. That which bears the name of Hildithryth is the largest of all that were found, either in that year or in 1838 and 1843, and may, therefore, be presumed to have marked the grave of a person of especial importance in the community. It was no unusual thing for persons who had compound names, such as Hildithryth, to be known and called by the first element in their names; thus, s.a. 571, in the English Chronicle, Cuthwulf, appears as Cutha, and s.a. 584, Ceolric, as Ceol; and, besides other instances which might be quoted from our own histories, the Chronicon Scotorum supplies a later one, calling the Emperor Conrad II. of Germany, s.a. 1024 and 1038, Cuana. For this reason, I have ventured to identify King Barnred, whose coin, found at Hexham, I have noticed above, with the traitor Buern, or Beorn. So Hildithryth may really have been the full name of S. Hild, and this stone her memorial.

A pyramidal stone, twelve and a-half inches high, which may have been the lower part of a small cross, or one of that class of memorials of which two examples from Sandwich are now in the Canterbury Museum, was found some years ago at Monkwearmouth, on a spot which is thought to have been a cemetery on account of the discovery of the remains of several bodies at the same time. It simply bears the name TIDFIRTH, and has been regarded as the memorial of a Bishop of Hexham, who died on his way to Rome about the year 820; but, as a large monumental slab, found within the western porticus of the church there, inscribed HIC IN

SEPVLCRO REQVIESCIT CORPORE HERIBERICHT PBR, marked the tomb of a simple priest, (who may, indeed, have been one of the abbots of Wearmouth) —it is scarcely probable that so small a stone would be set up in memory of an illustrious bishop.

The inscription on the cross from Lancaster, now in the museum at Manchester, is—

GIBIDÆTHFO	Pray for Cynibalth.
RÆCYNIBAL	(son of) Cuthbereht.
THCUTHBEREHT(ING)	

The late Mr. Kemble read the last word *Cuthberht;* I *Cuthbereht.* A doubt having been raised as to the fifth and eighth characters, I applied to my friend, Thomas Glover, Esq., for a fresh cast, and called his particular attention to these characters, as he had the monument itself to refer to. With regard to the former, he says, "this letter appears to me more like E than Œ, but the top is very indistinct." It must, therefore, stand as Mr. Kemble and I have read it, and it is certainly the character most naturally to be expected in this position in the name of *Cuthbereht;* although, as the rune *oethel* represents simple *e* in the inscription which will be referred to presently, we could not be much surprised at its occurrence here. With regard to the last, Mr. Glover tells me there is a large deep strip off the edge of the stone, at the end of the third line. Next to this is certainly H, and I think the branches of a T are attached to the top of its second stroke, so that it is HT. I supply conjecturally ING, in the space which has been chipped off. This seems better than the supposition that prayers are requested for two persons, and no copulative between their names.

There is an inscription, nearly effaced, on the beautiful

cross at Irton, in Cumberland. From the traces which remain I believe it to be—

+ GEBIDDÆTH
FORÆGODM
UNDÆSSAWLE
} Pray for Godmund's soul.

The Falstone inscription—

(*In Roman Minuscules*)

SET
+ EONAERTHET
TAEAEFTAER
HROETHBERTÆ
BECUNAEFTAER
EOMAEGEBIDAEDDERSAULE

(*In Runes*)

+ EOMÆRTHŒSŒTTŒ
ÆFTÆRROETBERH
TÆBECUNÆFTÆREOMÆ
GEBIDÆDDERSAULE

derives a peculiar interest from the fact that from time immemorial the population of North Tynedale has consisted of four clans—the Charltons (deriving their name from Charlton, near Bellingham), the Robsons, the Milbornes, and the Dodds; and that Falstone is especially the home of the Robsons, who undoubtedly derive their name from an ancestor, Robert, or Hrothberht. At what time they assumed this patronymic we do not know, but it is certain that the population of the dales of the Northumberland border has been as firmly settled from a time of remote antiquity as that of the neighbouring districts of Scotland, and the person whom this stone commemorates, undoubtedly a man of consequence in Falstone in the eighth century, may well be presumed to have been an ancestor of the Robsons, if not that one from whom they take their surname.

PROCEEDINGS

OF THE

GEOLOGICAL AND POLYTECHNIC SOCIETY

Of the West Riding of Yorkshire,

At the Seventy-sixth Meeting, held in the Guildhall, Doncaster, on Wednesday, September 28th, 1870,

WILLIAM ALDAM, Esq., in the Chair.

The seventy-sixth meeting of this Society was held at the Guildhall, in Doncaster, on Wednesday, September 28th. The attendance, which was not large, included—The Hon. Mrs. Ythil Barrington and Mr. Barrington; Mr. J. Walbanke Childers and Mrs. Childers, Cantley Hall; Rev. Chas. Childers, Nice; Mr. T. Walker and Mrs. Walker, Woodlands; Mr. R. A. Watson, Queen's College, Oxford; Mr. C. Baker, Deaf and Dumb Institution; Mr. and Mrs. Stephen Seal, Mr. W. Godfrey, Rev. W. H. Walker, Rev. J. J. Dalton, Mr. J. B. Sheardown, Dr. Sykes, Mr. J. Barraclough, (of Arksey,) Mr. Heslop, Mr. J. Tomlinson, Miss Simpson, Mr. J. Snow, Miss Appleby, Mrs. J. J. Dalton, Mrs. D. Roberts, Miss Rhodes, Miss Pearson, Mr. H. J. Cheeseman, Miss M. Rhodes, Misses Smith, Mr. Hawley, Mr. G. Mellor, &c.

William Aldam, Esq., of Frickley Hall, who occupied the chair, said that, as there were a great number of papers to read—although the attendance was limited, though perhaps as large as they might have expected—it would be better that they should commence the proceedings at once. He regretted that some one better qualified did not occupy the chair. At

first, when he was asked, he declined, because he thought he was not able to contribute one mite of interest to a society of that kind. This was the seventy-sixth meeting of the Society, which had been in existence for thirty-eight years. He thought he might congratulate the members on their success, for although the attendance was not large, still the Society maintained its importance, and the papers read had never flagged in their interest. The number of members of the Society, however, had fallen off, and it had been seen, as in other old Societies, when those who had originally interested themselves in it had passed away, their places had not been filled up. It was, therefore, important for the friends of the Society to exert themselves to increase the number of members in the neighbourhood of Doncaster, which at the present time was only about half what they were ten years ago. At one time the Society excited great interest here, in consequence of the active part which Mr. Thorpe took in it. In the last number of the Society's journal was an account of the interesting papers read at Pontefract. He thought that the programme for that day would be found not less interesting. With respect to the paper to be read by Mr. Sewell, whoever was acquainted with the beautiful scenery in the district of Rombold's Moor would feel greatly interested in hearing of anything connected with it. The paper to be read by Mr. Rowley treated of one of the subjects the Society first took in hand. The matter of coal getting was of vast importance, and had become of great interest to the people in this neighbourhood since coal mines had been established in the vicinity. Whoever aided in economising the working of coal, and saved the waste that was now going on, and made our present supply last longer, would render great service to society. Mr. Surtees had already thrown a great deal of light on the history of the Saxons in this neighbourhood; but now he was going to treat of a still earlier period,

and to read a paper on the British pit dwellings in the neighbourhood. The history of pottery had also lately had great attention paid to it; but the paper by Mr. Sandwith, to be read by Mr. Holmes, would take them much further than they had ever known the subject being treated before, carrying them back to the time that the Greeks first learned the art of making pottery. The last paper was on the Roman roads of Yorkshire—they had a good specimen of a Roman road in the immediate neighbourhood; and the history of these excited great interest. He would not occupy their time any further.

The following gentlemen and a lady were here proposed and admitted members of the Society:—Maken Durham, Esq., Thorne, Doncaster; J. M. Hepworth, Esq., Ackworth Hall, Pontefract; George Bradley, Esq., Acton Hall, Pontefract; M. Heslop, Esq., Doncaster; Mrs. Walbanke Childers, Cantley Hall, Doncaster.

ON SOME PECULIAR GEOLOGICAL FEATURES OF ROMBOLD'S MOOR.

BY MR. EDWARD SEWELL, M.A., F.R.G.S., OF ILKLEY.

No county in England is perhaps so remarkable as Yorkshire for the number of its moors or eminences with extensive flat tops, or tops consisting of a succession of plateaux, or slightly undulating ground.

Among these moors, not one that I am acquainted with comes so much under the denomination of a regular table-land as Rombold's or Rumble's Moor. Including outliers, it is nearly twelve miles in length, from Skipton to Baildon, and six miles in breadth, from the Aire, near Bingley, to the Wharfe at Ilkley; the summit reaches 1,320 feet above the level of the sea. From this high level the whole area of Rombold's Moor descends towards the river Wharfe in plateaux from three to four miles long, and three-quarters-

of-a-mile in breadth, each escarpment being from 90 to 120 feet lower than the other, up to the northern edge, which is not less than 650 feet above the river-bed. The principal parts of these wide flat surfaces range between 900 to 1,100 feet above the sea-level.

The internal geological structure of Rombold's Moor and its outliers embraces strata occupying the interval between the Lower Coal Measures of Baildon Hill and the Mountain Limestone of Skipton. Near Skipton, on the side of Rombold's Moor, the Limestone is succeeded by the Yordale Shales and Grits, and the latter by the Millstone Grit. The Government surveyors have lately, as is well known, divided the Millstone Grit into at least four sub-formations. I have not yet been able to make out to which of *these* the highest strata of Rombold's Moor belong. Generally speaking, the Grits and Shales are approximately horizontal, but here and there deviations from horizontality are strikingly marked. The general elevation of the strata may have been produced in a gradual manner, but there are abundant evidences of considerable convulsions at intervals; and whether the strata have been subjected to convulsions at one or more periods after their elevation or not, it is certain that they have experienced very violent movements; especially is this evident in many places on the north side of the moor. Appearances warrant us in saying that they have been turbulently smashed, so as to leave great fractures, in addition to the regular joints or divisional planes. This may be seen in a quarry in a deep ravine a short distance south-west of Ilkley, and between this quarry and Ilkley, at a lower level, a section reveals strata dipping at a very high angle nearly *south, or towards the moor.* (See plate I., fig. 1.) Whatever amount of disturbance may have been experienced by the strata of Rombold's Moor and the valley of the Wharfe, it is certain that the *present* form of the surface is the effect of the

PLATE, I.

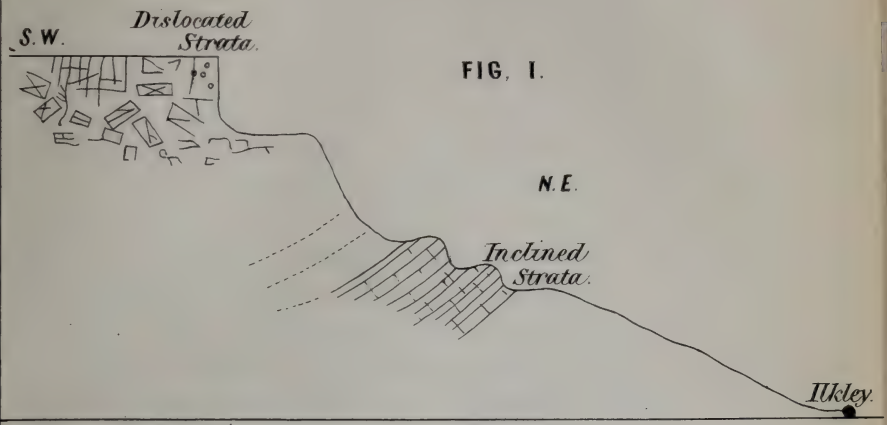


FIG. I.

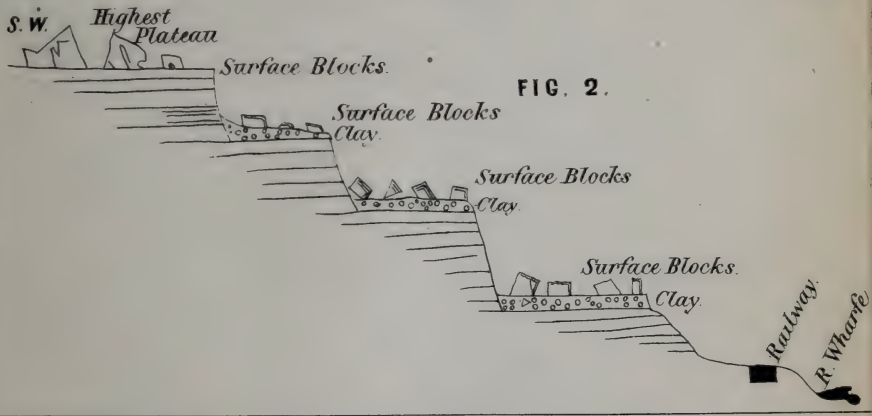


FIG. 2.

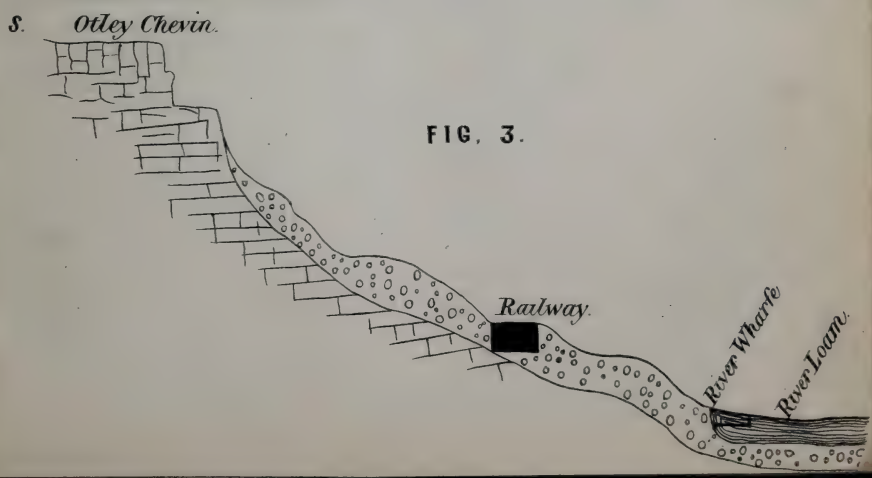


FIG. 3.

removal of great masses of rock by sea denudation. The gigantic cliffs at the north-east side exist, not because any gigantic fault has brought them up from a previous lower level, but because they have been left by the cutting away of the strata which once filled the wide valley of the Wharfe, which undoubtedly is a valley of excavation or denudation.

The top of Rombold's Moor has likewise been evidently left by denudation. It is exceedingly probable that it was once covered by a great thickness of Coal Measures, which have disappeared, with the exception of the patch composing the upper part of Baildon Hill. The Coal Measures have evidently been thrown up and divided by the Pennine range of hills between Lancashire and Yorkshire—Lancashire thrown to the west and Yorkshire to the east.

One thing is certain, that more or less rock has been removed from the top of Rombold's Moor. This is demonstrated by the terraces or plateaux, which are bounded by low escarpments or cliff-lines, the strata of which must once have extended much further than at present.

On the north-east side of the moor there are two very distinct terraces, above the principal cliff-line which surrounds a great part of the moor. Their scarps consist of a steep slope, with bare rocks at intervals, and their platforms of clay, containing stones more or less rounded. The lower terrace runs back into the higher towards the south-east, as successive beaches on a rising sea-coast are cut back into each other at the present day. (Plate I., fig. 2.)

I feel constrained to agree with Mr. Mackintosh, in his paper read last spring at Sheffield, in regarding all such terraces as having been formed by the sea, during the emergence of the land, either gradually, or intermittingly, or in the form of occasional sudden upstarts of small vertical extent. I likewise agree with him in looking on large valleys such as the Wharfe as the effect of sea action; at

any rate, I think Professor Phillips was quite justified in declaring, many years ago, that a survey of the whole line of the Ure and other contiguous valleys "appears to refute the opinion that the existing drainage waters have carried off *much* of the detritus."

On the flatter parts of Rombold's Moor, rain-water, by being retained, has favoured the growth of peat, but on the sides of the moor, where facilities are afforded for the water running off, rain-torrents have excavated a number of narrow, deep gullies, which give a very attractive variety to the scenery. But it is worthy of notice that when rain-water is not confined in a well-defined channel, it does but little in channeling the surface or destroying the rocky ramparts of the moor. The fresh-water gullies have in a great measure been formed in previously-existing and previously-spread-out detritus and drift, some of these gullies being from 30 to 40 feet deep.

There are few parts of the Millstone Grit districts of Yorkshire where the appearance of devastation, in the shape of scattered and heaped-up blocks, is so strikingly presented as on the north side of Rombold's Moor, near Ilkley. At first sight it is natural to conclude that a convulsion has broken up the crust of the earth, and dispersed these blocks; but a little investigation will be sufficient to dispel this idea; for though it be true that the strata have been shattered in many places, yet no shattering agency could have thrown or carried the blocks to the positions they now occupy; but I think these positions may be explained by four modes of geological transportation.

First. The mere tumbling down of blocks through gravitation, during or after the period of the formation of the cliffs and rocky slopes.

Secondly. The fall of blocks which have been loosened by rain.

Thirdly. The action of the sea (when Rombold's Moor was partly submerged) first undermining the cliffs, then carrying the blocks down hill, and lastly placing them or piling them up in their present positions.

Fourthly. The action of coast-ice during the glacial period, which must have been adequate to detach, launch, and disperse blocks on a large scale, on a sea-coast such as the north-east escarpment of Rombold's Moor must have formed.

I can believe that the first two agencies have been at work through every geological period up to our own times on the north-east side of the moor, for we well know that the tumbling down of blocks through gravitation and rain is a process now in action over vast portions of the earth's surface. But infinitely more have the two latter causes performed the colossal work now shown on the north side of the central part of Rombold's Moor. That the sea has rushed over the whole of Rombold's Moor is evident from a variety of phenomena, some of which have been already described, while others will be noticed shortly. That floating ice must have acted on the north-east side of Rombold's Moor would appear from the beautiful display of glaciated and grooved rock-surface a short distance from the Cow and Calf, about 900 feet above the sea-level, mentioned by Mr. Mackintosh in his paper read at Sheffield, and which I myself have examined repeatedly. The *striæ* indicating a movement from the West. I feel convinced that no glacier could have polished and ground this rock-surface as it now appears, and this I infer from the physical geography of the district to the west and north. That the scattering of the surface blocks under consideration could not have been the effect of a glacier flowing down the valley of the Wharfe, would appear from the almost total absence of Limestone blocks and fragments on the

north-east side of Rombold's Moor; for a glacier would surely have carried Limestone from the upper part of the Wharfe valley to the area where the scattered blocks of Grit are the most abundant. This immense bed of tumbled and broken rocks extends over an area of not less than four square miles, many of the blocks weighing at least from 30 to 50 tons. (See plate II.)

Amongst the thousands of scattered blocks and fragments there are many which must have been transported from a distant part of the moor, while most of them could not have tumbled to their present position. It is difficult to say how many beds of the fine white saccharoid sandstone, called *calliard*, might be found on Rombolds Moor; but I have no hesitation in asserting that numerous blocks of this calliard now occupy portions at considerable distances from the parent rock. They may be seen on the top of the moor, and in greater abundance strewn along the north-east slopes, about 50 yards east of Ilkley College, and between the smooth grassy slopes, on which upper Ilkley stands, at the base of the cliffs. This is one of the most impressive assemblages of loose blocks I have anywhere seen. Many of the blocks are calliard where no calliard *in situ* can be found in the neighbourhood. (See plate III.)

At the north-eastern corner of the lowest escarpment of the moor there is a remarkable rocky phenomenon, called the Hanging Stones or Cow and Calf, which deserves a passing notice. Tradition says that the huge piece of rock to the north of the main cliff was detached and rolled to its present position during a terrible storm at the close of last century; and certainly one face of this so-called Calf retains the appearance of having been joined to the cliff high above it; however, admitting the bare possibility, it does not appear probable that the Calf could have fallen from the Cow by the mere force of gravitation, but I do believe that a sufficient

PLATE III.

GLACIATED BLOCKS OF SACCHAROID MILLSTONE GRIT IN SITU NEAR ILKLEY COLLEGE.

HANGING STONE, ILKLEY. COMMONLY CALLED COW AND CALF ROCKS.

CENTRAL PLATEAU OF IMMENSE TUMBLED BLOCKS OF GRIT ON ROMBOLDS MOOR.

explanation may be found in the action of sea waves, either with or without the assistance of coast ice. (Plate IV.)

The above-named blocks, as regards their dispersion, cannot be separated from the boulders which occur lower down in a deposit of clay. Beginning with the river Wharfe, we find that it has excavated its channel in boulder clay, washed away the smaller stones and left the larger. Here and there it has deposited shingle, mainly derived from the stones of the boulder clay. I say mainly, because in some parts of its channel, there are many limestone pebbles, which look as if they had been washed down by the river from the limestone rock in the upper parts of the valley. On the side of the Alexandra Road cutting, leading out of Ilkley towards the bridge, there is the appearance of clearly-washed river shingle abutting against a deposit of boulder clay. But the rounded stones, so far from being confined to the river shingle, are often quite as characteristic of the *boulder clay* in the lower part of the valley. They are nearly all millstone grit; limestone, though not absent, being very rare. They gradually become less round and more angular as we ascend the slope towards the base of the cliffs of Rombold's Moor, where some of the stones still retain their roundness though most of them are angular. The clay about Ilkley and towards the north-west forms a flat plateau slightly sloping towards the river. About a mile to the west of the town it comes up to the base of a fine cliff line with enormous fallen blocks, which runs along the base of the terraced escarpment of Rombold's Moor; some of these blocks weigh not less than 100 tons, hundreds of acres being covered with them embedded in diluvial detritus, from 15 to 20 feet deep, containing great quantities of rounded pebbles, showing unmistakably that a tremendous quantity of *débris* must have been swept down the valley during the ancient sea-period, and singular enough the configuration of this portion of the valley along with the

peculiar wind currents all tend to prove that this really was the case. In a few places near this point blue clay makes its appearance, and, I believe, it would be found under the yellow clay in most places if sufficiently deep sections were to be exposed. But in the valley of the Wharfe, the scattered yellow clay is often variegated, and might be mistaken for the true blue clay. In and around my garden the clay is bluish, but to which of the formations of boulder clay it really belongs I cannot positively say. It is full of boulders more or less rounded, some of them very large, and several of them glacially rubbed and striated.

Between Ilkley and Arthington the yellow clay, sometimes visibly underlain by the blue, often makes its appearance in the railway cuttings. It runs up the south slope of the Wharfe valley till it graduates into the angular detritus underlying the escarpment of Otley Chevin. (See fig. 3, plate I.) Between Burley and Guiseley there is much boulder clay, either in knolls or flat plateaux. At Guiseley Railway Station, about 450 feet above the sea, there is yellow clay, apparently running down into the blue clay, but the line of demarcation between the two is probably connected by a facing or slight down-washing. It contains boulder and smaller stones of Millstone Grit, Sandstone, and a small per centage of Limestone. The boulder clay here rises up nearly, if not quite, to the summit level of the watershed between the Wharfe and Aire valleys, and covers large areas where it is impossible it could have been distributed by fresh water. Westward, it graduates into the angular detritus and loam underlying the eastern escarpment of Rombold's Moor.

Comparing all the varied phenomena, so well known to geologists, spread over the north-west of Yorkshire, I am constrained to agree with the general theory enunciated by Professor Phillips, that during the elevation of the strata the

present surface features, consisting of valleys, watersheds, and escarpments, mainly originated while the land was under the sea—while the valleys formed inlets, the watersheds straits, and the escarpments sea cliffs.

SOME OBSERVATIONS ON COAL AND COAL MINING, AND THE ECONOMICAL WORKING OF OUR COAL FIELDS. BY MR. WALTER ROWLEY, MINING ENGINEER, LEEDS.

At our meeting in Pontefract last November, our honorary secretary, Mr. William Sykes Ward, expressed a wish that some members of this Society would contribute papers on the most economical mode of working Coal Mines. My only apology as an amateur geologist, and so young a member of this Society, for complying with Mr. Denny's request to prepare these observations (and at the same time continuing a series of papers so ably inaugurated by our friend Mr. Tew, and which I trust will be continued by many present), is an earnest conviction that the best way to assist each other in the pursuit of knowledge, is by every member contributing, out of the storehouse of his own experience, those results which circumstances and his daily occupation have given him the best opportunity of investigating; hence the subject of my paper, prepared with considerable diffidence, but with a hope, that with your assistance, we may exert our utmost to stem that tide of "wilful waste" which in the end will make "woful want" of a commodity the most valuable that a nation can possibly possess as a source of national wealth.

The writer, on the present occasion, will pass over the geological introduction by which this paper might be preceded, and thus avoid the charge of having presumed to linger on ground where often, mining engineers fear to tread, lest they come in collision with our geological *savans*, who, during the last few years, by their valuable

books and papers (indicating a wonderful progress in this beautiful and fascinating science), have assisted the mining engineer to an incalculable extent.

As a basis upon which to build the argument of my paper, I have selected the Middleton Main Seam of Coal as being one of the most important and substantial seams in the whole series, considering the area it occupies and the average thickness it attains to (nearly 4 ft.), in the Yorkshire Coal Field.

My illustrations represent the two generally-recognised systems of working the above seam; and the figures and deductions that I may hereafter make, are taken from personal knowledge of the results actually obtained from the working of the above seam under both systems in the same district.

For simplicity in discussion, and as comprising all we require for the purpose of this paper, I shall condense the various modes of working Coal in Yorkshire into two systems, viz., "pillar and stall" and "longwall" with pack-gates, for all the recognised modes of getting Coal are but modifications of either one or the other of these two systems.

I shall first refer to "pillar and stall," and, here in passing, it may be interesting to mention that the most primitive mode of getting Coal seems to have been associated with this idea. Even so far back as the Roman occupation in this country, at any rate, it is recorded on incontestable evidence, during the Anglo-Saxon period of about the 9th century, where evidence has been collected of the Coal having been obtained in this rude form, better described as consisting of getting a piece of Coal and leaving a piece alternately. At the same time, in justice to the Romans, who were an exceedingly practical and skilful race, we must remember that they were limited to "basset" workings, and, consequently,

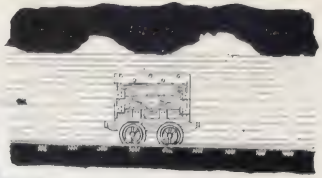
PLAN, Nº I.

Shewing the Working of Coal

BY

BANKS & PILLARS.

FIG. I.



REFERENCE.

Direction of the Ventilation →

Air Crossing to carry Return Air over the Intake or Fresh Air

Stoppings ⊏ Doors ⊏

WORKING FACE
GOAF
WORKING FACE
GOAF
WORKING FACE
GOAF
WORKING FACE
GOAF
Magnetic Meridian
GOAF
W. FACE
WORKING FACE
GOAF
WORKING FACE
GOAF
WORKING FACE
GOAF
WORKING FACE
GOAF
WORKING FACE
GOAF
DOWN CAST
UP CAST

Scale—8 Chains to 1 Inch.

WALTER ROWLEY,
MINING ENGINEER,
X.Y.Z.O.S.

had not any other alternative. Had they worked at greater depths, and possessed a proper roof, they might very probably have adopted some system of longwall. This historical record is the parent of the present system of "pillar and stall," greatly altered and improved, but still retaining the impress of its origin; hence, perhaps, may arise the reluctance in many minds, to change a system that has grown with them, and been handed down to them from their forefathers, for one that has been long practised with uniform success in the Coal Fields of Derbyshire and the Midland Counties.

The combination of this system of "pillar and stall," as practised in the Yorkshire Coal Field, may be described as "Banks and Pillars," as illustrated in my plan of that method, and marked No. 1, the distinguishing feature of which consists of getting a certain portion of the Coal, and leaving the remainder as pillar, to support the roads, and prevent any movement in the ground or roof of the seam. The Coal thus left is either permanently lost, or left until some remote period in the history of the mine, to be either partially or totally removed. In either case the results are equally unsatisfactory, for, generally, when it is got afterwards, the length of time that it has borne the pressure of the superincumbent strata, renders it almost worthless. Being mostly crushed into small Coal, it is almost impossible to work such pillars at a profit, hence arises the momentous question: What is the best mode of getting a given seam of Coal? upon which decision, in opening a colliery, depends whether it shall be an absolute loss, or a remunerative profit to the owner. For if the workings of a mine are badly set out and unskilfully conducted at the commencement, the consequences are an unremunerative investment of capital and frequently-occurring accidents; hence, how important it is in colliery operations, that the mode of getting the Coal, and the

discipline inaugurated at the beginning, should be carefully carried out afterwards.

The plan that I have made of pillar workings is, I think, one of the most economical that such a system will admit of, the ventilation having the advantage of supplying each district or sets of banks with its own separate portion of air, instead of the objectionable plan of carrying the air round the mine in a single current. On my plan the direction of the ventilation is shown by the arrows, and I have also marked the necessary air crossings and stoppings, etc. You will notice that the air is passed up the pillar board, on one side of the bank, along the crossgate, and into the return air road. I should first have mentioned that the preliminary operations of the mine consist of roads or endings being driven in pairs, following the cleavage of the Coal, at distances varying from twelve to twenty chains, according as the nature of the roof will admit of, and between these endings the Coal is got in banks of different widths, varying according to circumstances, from forty to sixty yards. Every set of banks consisting of some four or five boards, each about ten yards wide, out of which the Coal is brought, and conveyed along the main board into the ending leading to the pit bottom. A pillar of Coal is left between these banks, of about forty yards in width, which is brought back when the banks are finished.

The area of Coal occupied in this way, in the form of pillars, is not less than 50 per cent. of the entire area of the Coal field; and the production, instead of being about 6,000 tons per acre in the seam now referred to, four feet thick, would realise only about 3,000 tons of Coal until such time as the pillars are removed; then again, this system produces a large proportion of slack or small Coal, by reason of the holing required, and it being got facing the cleavage of the Coal. This, with the increase of slack produced in working the pillars, will often raise the percentage of small

PLAN, Nº 2,

Shewing the Working of Coal

BY

LONG WALL.

REFERENCE

Direction of the Ventilation

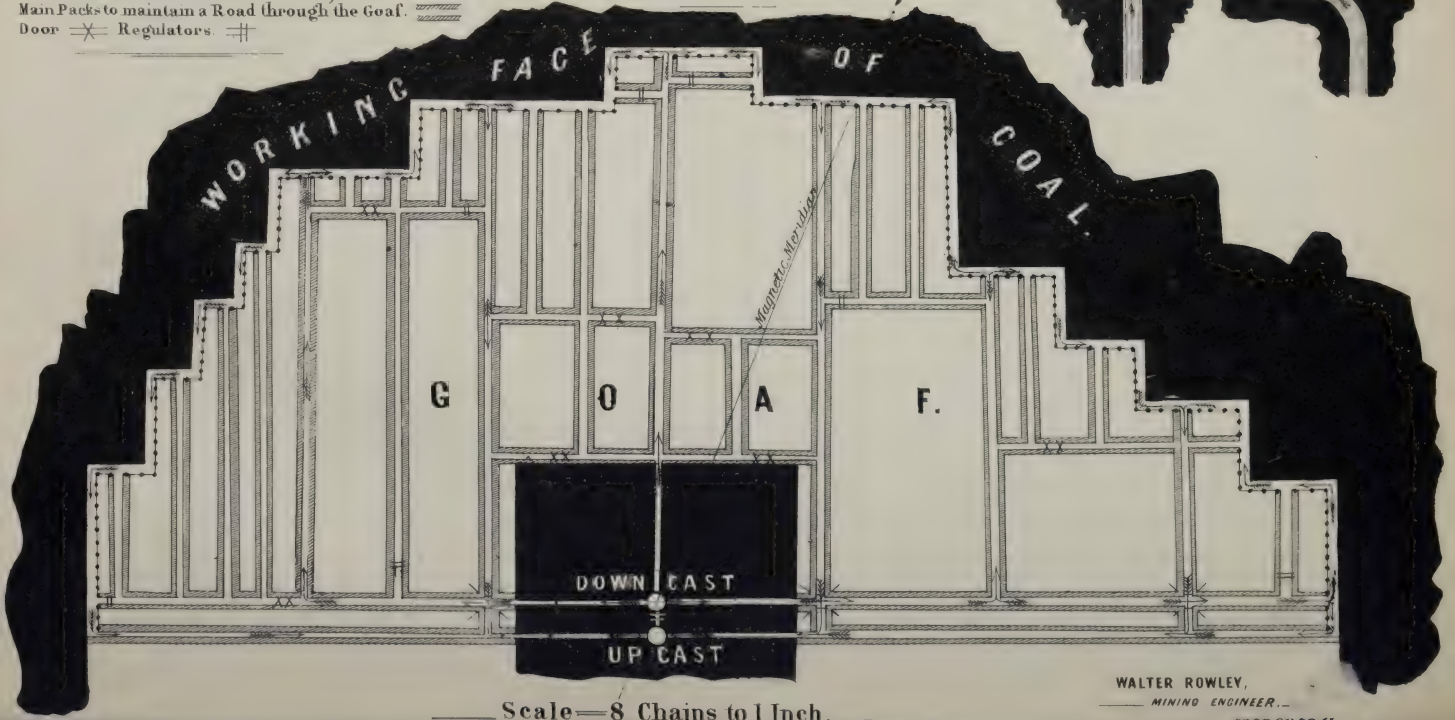
Air Crossing to carry Return Air over the Intake or Fresh Air

Main Packs to maintain a Road through the Goaf.

Door — Regulators.

FIG. 2.

FIG. 3.



Scale—8 Chains to 1 Inch.

WALTER ROWLEY,
MINING ENGINEER.
XXXDS.

Coal to 40 and even 50 per cent., thus leaving little more than 3,000 tons of large Coal yielded per acre.

You will easily understand what a fearful loss this must be in an extensive Colliery, where such Coal will only realise in the market from 2*s.* 6*d.* to 3*s.* 6*d.* per ton; consequently, where there is not a sufficient manufacturing demand at hand, and it will not readily make into coke, it is found better to save the carriage of it by leaving a portion in the goaf along with any other refuse obtained in getting the Coal. The refuse in many Collieries is very considerable, particularly where the seam of Coal is divided by partings of shale and earth. This is an item of very serious trouble and expense in many mines. It would be a great gain to the country if the Coal dust, which we see accumulated in heaps at all large collieries, could, either by improved mechanical arrangement, be consumed as Coal, or manufactured into artificial fuel. The former expedient has been attempted by Mr. Thomas Russell Crampton, at Woolwich, with his Coal Dust Furnace; and the latter alternative by mixing dry pitch with the same, under a process invented by M. Chagot, the engineer to some Coal Mines in Saône et Loire, France, both experiments resulting in a fair measure of success.

Holing in the Coal is, at all times, *productive* of much *waste;* consequently, where the ground or base of the Coal is of a soft nature (more usually so than otherwise) the holing should be made in the seam of under clay usually existing below the Coal.

I now come to the brief consideration of "Longwall" workings, as illustrated in my plan marked No. 2., the distinguishing feature of which is the extraction of the whole of the Coal (after leaving sufficient for the support of the shafts) in the first process of working, by means of long continuous faces. The preliminary operations of this system

usually consist of a pair of levels being driven east and west of the shaft, out of which, as the Coal proceeds to be got, artificial roads are made thirty or forty yards apart, according to the nature of the roof. These roads are made by being packed on either side with the *débris* obtained in the getting of the Coal. The roads are always kept close up to the face, and the failure of this system on some occasions where it has been introduced in Yorkshire, has arisen solely from these walls not being built in a solid and substantial manner, for unless they are, the roads through the goaf and the bank face are sure to be buried, as well as endangering the ventilation. If this be properly done, and with anything like a suitable roof and competent management, I do not fear any failure.

At the face of the Coal, the men are protected by one or two rows of props, and here I may remark in passing, that these wood props, intended for safety, are often a source of danger when worked under incompetent or unskilful management, for you may have too many of them as well as too few. In Longwall, our object, after securing the safety of the miner, is to let the roof gradually bend down upon the goaf, and throw all possible weight upon the face, to facilitate the economical getting of the Coal.

As the face of the Coal advances, the hindermost props are brought forward, and the roof let down; the sooner and the better; the longer your face of Coal, and of course the greater will be your supply, which can be made very great under this system; but to arrive at perfection in quality, as well as quantity, I would in most cases have the Coal worked or broken off at right angles to its natural cleavage, or, as it is commonly called, "end working." Any person not conversant with this end way of getting Coal, will understand my meaning by examining an ordinary block of wood; if you break it off with the lines of cleavage, it produces thin

splinters of wood; if broken off at a right angle to its natural formation, or on the end, you obtain large cubical blocks of the same. It is just the same with Coal; unless so worked, we cannot obtain that maximum quantity of large Coal so much to be desired, for instead of 30 to 50 per cent. of slack in bankwork, I have known it reduced in one instance, where the Coal is riddled in the pit, to under 6 per cent. for the average of one year's workings in Longwall got endway. This increased yield of round Coal will far more than compensate for any slight extra cost incurred in getting, which the following figures, calculated from the seam referred to, and strictly correct, will show to be very slight indeed.

To avoid going over unnecessary commercial ground, I have only calculated the items of cost up to such a stage in the getting of the Coal, as when the charges become the same under both systems. The following figures, therefore, represent not the actual profit obtained, but only the difference in favour of one system over the other. In working this seam in Banks and Pillars, I find that 60.88 per cent. of large Coal, and 39.12 per cent. of slack, was obtained, which cost in getting 2*s.* 1*d.* per ton; this, taken at the respective sale prices of 7*s.* and 3*s.* 6*d.* per ton, realised £28 2*s.* 9*d.*; or an average of 5*s.* 7.53*d.* per ton.

Working the same seam by Longwall, I found that 81.75 per cent. of large Coal, and 18.25 per cent. of slack, was obtained, which cost in getting 2*s.* 3*d.* per ton; this, at the above sale prices, deducting the slight difference in cost of getting, amounts to £30 18*s.* 7*d.* per hundred tons; or an average of 6*s.* 2.23*d.* per ton. Now, assuming an average weekly production of 3,000 tons of Coal (which a modern well-arranged Colliery, where the discipline is good, ought to attain without any difficulty), we have a difference in favour of Longwall of 6.70*d.* per ton, which is equal to £83 15*s.* per week, or a saving of £4,355 on one year's production.

This is under the result actually realised, as the writer, in these calculations, has assumed the same sale price for Coal got by both methods, whereas, Coal got in large cubical blocks (as obtained under this system of Longwall on end), is worth at least 6*d.* per ton more than the same Coal got boardway.

In presenting these returns to you, I may possibly be charged with having selected an exceptionally favourable Coal seam; such, however, is not the case, as the "Middleton Main" is certainly not the most economical Coal in the series, so far as concerns its economical adaptation to Longwall workings. I do not say these gratifying results can be obtained in every seam of Coal, but I do believe, after a very careful investigation of the subject, that there are few seams where such a system could not be adopted with advantage; and the analysis I have given from results actually obtained in the same bed of Coal, show what an important part the method employed bears in the economical working of our Coal fields.

The ventilation, under this system, is obtained as follows, and is characterised by its remarkable simplicity:—The workings of the pit are divided into districts, to each of which is supplied a separate current of fresh air, which is delivered at the face of the Coal without that waste in its journey, which is involved in any system of pillar workings. The air, after travelling over the limited district assigned to it, passes into a return air course made through the goaf; into these roads there are cross roads from the intake air courses, to furnish a limited quantity of fresh air, for rendering any obnoxious gases harmless in their passage to the upcast shaft, thus purifying the goaf without adulterating the air passing along the face of the Coal.

All the main roads used in working, and for the passage of air, should be constructed as large as possible, so as to obtain

economical haulage and adequate ventilation. Corners and projections in the sides and roof of the roads, should be avoided as much as possible, for if the roof is irregular, you will see by observing the line along which the air travels, as shown in my illustration marked fig. 1, that these cavities above you, do not get any ventilation except by an artificial arrangement of brattice cloth. Carburetted hydrogen gas, being lighter than air, ascends and accumulates in these places, therefore the more regular in shape you can keep your roads, and the safer and more economical it is.

Where two returning currents of air join each other, the junction should not be made at right angles, as is shown in fig. 2, and as is usually the case, but effected in the manner illustrated in fig. 3, where you will observe that the two currents, at the point of junction, have both the same direction, and therefore assist each other, instead of the objectionable plan of meeting at right angles, where one current must naturally impede the course of the other.

In pillar and stall workings there is the absence of this valuable current of fresh air, just at the place where it is most wanted, as no proper quantity of air can be obtained in banks of such limited area, situate out of the main air roads. This system of ventilation is economical in other ways, in addition to the increased safety afforded to the miner, inasmuch as it dispenses altogether with the large outlay consequent upon the driving of long narrow roads, unprofitable in themselves as well as detrimental to the physical health of the workman; it thus affords to the proprietor the quickest return for his invested capital.

The ventilation under any system of pillars, is attended also with greater risk, on account of the large area of goaf shut up between these pillars, where the explosive gases accumulate, and are a constant source of danger in fiery mines.

Reference to the Reports of Her Majesty's Inspectors of Coal Mines, show very conclusively the relative safety of these two systems of getting Coal, which, taking the average nature of the Coal seams in various districts, will be a strictly just and reasonable comparison.

The number of accidents from falls of roof and Coal in the Yorkshire Coal Field, amounted in 1869 to 59 per cent. of the accidents from all causes. This refers to a district where "Longwall" is the exception, and some form of bankwork the usual method employed.

Mr. George Fowler, in a recent paper read before the Institute of Civil Engineers, has very ably analysed this important inquiry. He finds that, "Out of a gross tonnage of "198,636,043 tons obtained by pillar work in 1866, 1867, "and 1868, the casualities by falls were 814, or 231,739 tons "of Coal for each life lost. Of a gross tonnage of 22,899,000 "tons extracted by the longwall plan, the casualities were "75, or 1 life for every 305,320 tons. If the latter ratio "existed in pillar work, the casualities would have been "reduced from 814 to 614, or a saving of 200 lives." This happy feature in longwall is produced by the absence of those small and weak pillars of Coal which we find in all pillar or bankwork; on the other hand, Longwall attains its smaller percentage of accidents from the fact that the roads are built well and there only being a limited area of roof exposed to the workman; the worn out and bad roof being allowed to bend itself and settle upon the old goaf, and, as I previously explained, utilised to help in getting the Coal. As the miner advances, there is always a new roof to protect him which has never done any duty before. Then, again, there is another arrangement very general in Longwall mines, which, the writer thinks, greatly helps to bring about these results, viz., that the building of the packwalls, and the timbering and supporting of the roof, in Longwall mines, are

usually attended to by skilled men whose duties are confined to this work, and not by an unskilled hewer of Coal, whose only object is to economise his own time and labour. I have observed this evil wherever men are allowed to timber and build the roads for themselves. This beneficial rule might be made more general and perfect, even in Longwall mines, than it is at present. The importance of this portion of Coal mining being done well, we can all well understand when we remember that the existing drain upon the lives of our miners cannot be traced to explosions, for the heaviest item is due to falls of the roof.

In 1868 and 1869, the deaths by explosions in the British Coal Fields amounted to 411, whilst by falls of the roof we find 911, or more than double. The public take but little heed of the latter, because of the comparative smallness of the event, when a fall of roof is recorded, and one or two lives only, lost; but they do take heed of explosions, on account of the disastrous consequences which usually follow, although in themselves of rare occurrence; but the colliery manager, who has an eye to a good balance at the end of the year, knows the ultimate cost of these frequently-occurring accidents, which only take one or two lives at a time, but which justify the writer in making rather more than a passing reference to.

Associated with the miners' duties just referred to, comes the use of gunpowder in collieries, which, like the packing and timbering, should devolve upon one man skilled in the use of the same, and a close observer of the presence of the smallest portion of gas; for, when the miner has this dangerous weapon in his own hands, he is tempted to use too great a quantity than is absolutely necessary to separate the mass of Coal worked upon from the solid, instead of bringing it down with as little fall as possible; and so, while protecting himself, avoid the possibility of disturbing the ordinary ventilation of the mine.

This rule would, I think, help to produce a greater immunity from explosions of gas, for most of them are traced to the incautious practice of firing shots in the neighbourhood of accumulations of gas; hence the importance of this duty being attended to by an intelligent workman—and it can be practically carried out more effectually under the necessary discipline of "Longwall," than by any other method.

The writer is of opinion that the extension of this system of "Longwall" in Coal mining, is the pioneer paving the way for the working of this mineral at greater depths than we are accustomed to at present, for under no system of pillar workings could we get adequate ventilation at such depths as necessity will compel those following after us to venture to, for when we come to work at depths of 1,200 yards and upwards, we shall strive to convey all the air we can collect direct to the working faces unimpaired, avoiding all circuitous air courses, which would so diminish as to render the ventilation totally inadequate.

Associated with this portion of my subject, I may state that the deepest mines in existence, where we may collect evidence as to the temperature under the above circumstances, are Rosebridge Colliery, in Lancashire, 806 yards deep, the normal temperature of the Coal at that depth being 93 deg., while the temperature of the air passing through the workings is 78 deg.; at Denaby Main Colliery, 440 yards deep, the deepest and nearest mine to Doncaster, the temperature of the air passing through the workings averages about 68 deg.

In Belgium, Coal Mining has descended to a depth of nearly 1,200 yards, and from some observations that I made during a recent visit to the Coal fields of that country, and also from personal experiments that I have made at depths up to 500 yards, I have found the average increase of tempera-

ture to be about 1 deg. Fahr. in 76 feet; and from experiments made at depths from 500 to 1,000 yards, and furnished to me by Monsieur Lambert, Inspector of Mines at Charleroi for the Belgian Government, and to whom I am greatly indebted for his valuable assistance, I calculate them to indicate an increase of 1 deg. in 125 feet, showing for our encouragement, that at increased depths the temperature does not increase at the same rapid ratio that it does at shallower depths, which, as we proceed under the Trias and Permian formations, I anticipate to become still more favourable, inasmuch as these deposits produce little or no heat, being generally very cold, and in some districts very wet. At the same time, therefore, in working Coal at these depths, it is not at all improbable that this temperature in some instances may be considerably reduced by natural causes, such as the evaporation of water passing through the overlying strata, combined with the most perfect mechanical and general arrangement of ventilation.

This subject of the ratio of increase of temperature of Coal mines at increased depths, bears a most important and interesting part in the economy of our Coal fields in the future, and as it is one that chemists and engineers have somewhat investigated of late, I hope some member of this Society will contribute a paper on that subject.

There is another insuperable barrier to pillar workings at increased depths, in addition to the ventilating difficulty just referred to, viz., the pressure of the superincumbent strata upon such pillars of Coal, which will necessarily increase the deeper we go. At the same time, in investigating this subject, we cannot draw an infallible rule for the rate of increase, which is regulated a little by the material passed through; for instance, if the sinkings pass through any rocks of great thickness and extent, the pressure might be somewhat relieved thereby. A cubic foot of rock sand weighs 156

pounds; of shale or bind, 160 pounds; and of Coal, 82 pounds. Mr. Fowler calculates that the "Average weight of "these in different localities may be taken at 144 pounds per "cubic foot of the Coal measures, which represents a pressure "of one pound per square inch for each vertical foot of "strata. A Coal seam, therefore, 1,000 feet deep, will have "a dead loading of 1,000 pounds per square inch upon it as "it lies untouched."

I think these calculations to be as near as it is possible to arrive at, not forgetting that there would be an increased local pressure, varying according to the system of Coal mining employed; it would therefore be impossible to preserve any pillars of Coal, however large they might be, if once disturbed; and even if it were possible to get such pillars, it would only be at a loss; hence "Longwall" suggests the removing of this pressure from the Coal on to a well constructed artificial goaf, built as the workings proceed.

The writer is convinced that "Longwall" will pave the way for a revolution in the detail of Coal mining, which must come sooner or later, viz., the extensive use of machinery in Coal getting. The public have before them at the present time, a great variety of inventions, aiming to do this successfully: some arranged for baring, and some for breaking down the Coal, and some aspiring to do both operations. The motive power employed is often hydraulic, and in some instances compressed air. Mr. Grafton Jones's breaking-down machine, and the machines of the West Ardsley Coal Company, are the most successful representations of such inventions that have appeared up to the present time, but as Mr. Jones's machine is only a substitute in most instances for the use of powder, and although it may be very valuable in some seams as a mechanical wedge for breaking down the Coal where the use of powder damages the same, or creates danger by the probable existence of fire-damp, still the baring of the Coal

is the work of greatest value; consequently, no machine that does not do that work, can become of general application, at any rate, I think, in the Yorkshire Coal Field. Therefore, although there have been many inventions of merit introduced, still the machines of the West Ardsley Coal Company are the only practical illustrations existing of what has been done up to the present time, and I venture to express an opinion that the inventors and owners of the pick-machine, judging by the measure of success already obtained, seem destined in the end to solve the problem of how to get Coal without the immense amount of manual labour and waste of time at present required. A description of these machines, and the results obtained, would afford ample material for a most interesting paper; on this occasion, I have not time to make more than a passing reference to them. I hope some friend will take this subject up, and deal with it in that comprehensive manner that its importance entitles it to.

These machines, in time, as the practical application of them becomes better understood, will surely, however slowly, ripen to perfection, and no system of getting Coal is so peculiarly favourable—nay, I may venture to add absolutely necessary—to the economical adoption of machinery, as that of "Longwall," by reason of the long-continuous face of Coal open, to which there will always be a direct highway from the pit bottom, for the easy conveyance of compressed air, or any other motive power employed. The use of machinery will rather tend to increase the amount of ventilation than otherwise.

I now come to the net results obtained by the extension of this system of Coal Mining by Longwall on End, which I believe to consist of the following:—

1st. Economy in its results to the proprietor, from the increased market value of the product attained, and the soonest return for his invested capital.

2nd. Economical ventilation, and increased safety to the miner.

3rd. Simplicity, and less liability to accidents; and—

4th. An increased quantity of useful Coal from the same area. This is the national gain all desire, and which, the writer believes, will be best obtained by the diffusion of improved mining knowledge concerning such a system, rather than by legislative interference.

To our local friends in the neighbourhood of Doncaster, the economical working of our Coal field is a matter of great interest, standing, as at present we do, upon those Coal measures underlying the Permian Rocks, a section of which I have added to my illustrations, calculated from what I consider the most reliable data; their value and extent may be estimated by one fact, viz., that in this section are represented all the seams belonging to the Yorkshire Coal Field, numbering nearly 40, with an aggregate thickness of nearly 90 feet, at least 30 feet of which will be workable sooner or later in this district.

Those seams underlying the Permian formation, *already worked*, I have distinguished on my section, and also added the locality where such Collieries are situate.

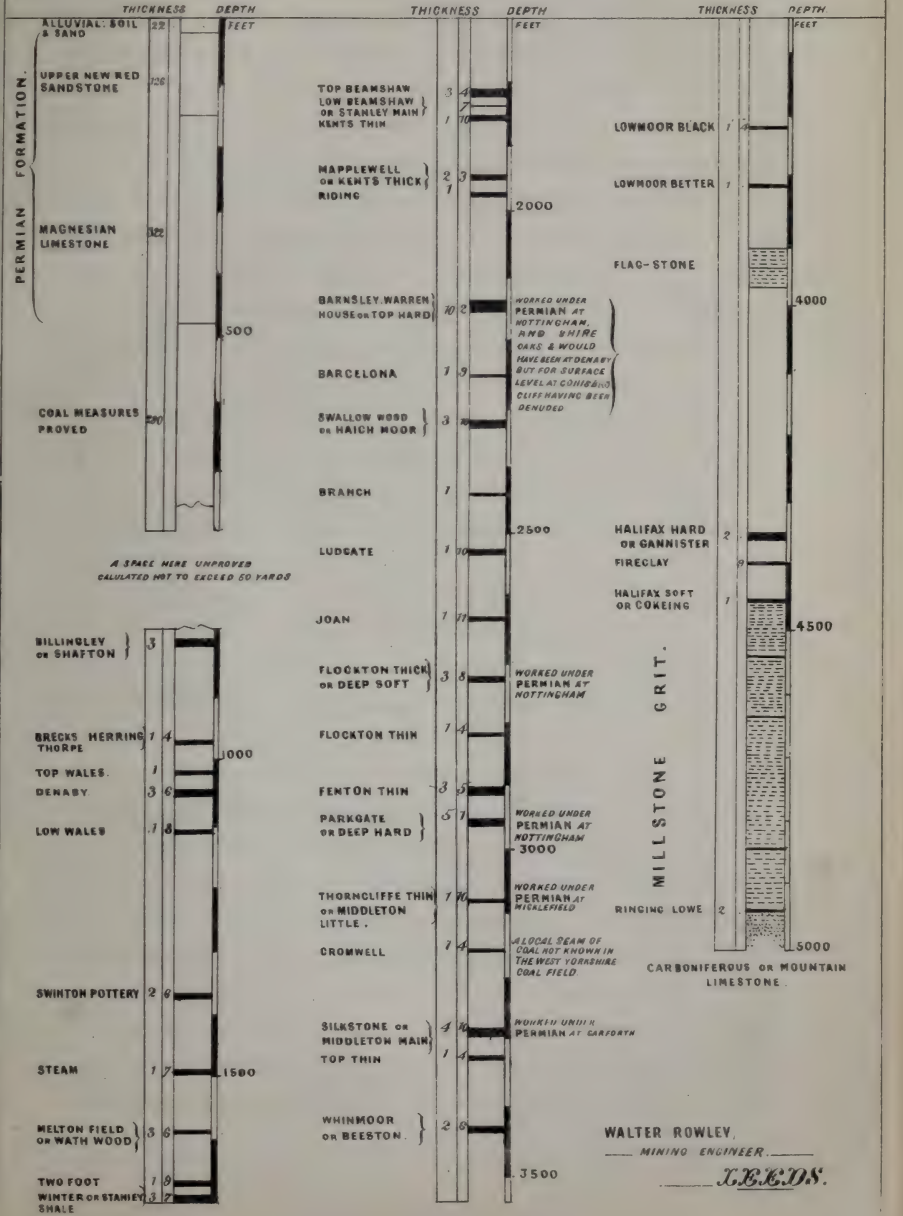
The above rocks will have to contribute the Coal Fields of future generations; at the same time, situated as the *upper* portion of this Coal field is, within a practicable depth, I do not see any reason why it should not contribute its share to the requirements of the present century, and I express my astonishment that it has not already been developed, and thus locally derive the advantage of the excellent colliery sites which are to be found in the vicinity of Doncaster. My own opinion has been confirmed by a friend of mine, of great commercial experience in the Coal trade, that Doncaster is unequalled in its Geographical position by any colliery district in the kingdom. With a willing and liberal

Section of the Coal Field underlying the "PERMIAN ROCKS" in the District of Doncaster.

IN WHICH IS COMPRISED THE WHOLE SERIES OF COALS BELONGING TO

THE YORKSHIRE COAL FIELD.

1870.


THICKNESS
DEPTH
FEET
PERMIAN FORMATION.
ALLUVIAL SOIL & SAND 22
UPPER NEW RED SANDSTONE 126
MAGNESIAN LIMESTONE 322
500
COAL MEASURES PROVED 220
A SPACE HERE UNPROVED CALULATED NOT TO EXCEED 50 YARDS
BILLINGLEY OR SHAFTON 3
BRECKS HERRING THORPE 1 4
TOP WALES 1
DENABY 3 6
LOW WALES 1 8
1000
SWINTON POTTERY 2 9
STEAM 1 7
1500
MELTON FIELD OR WATH WOOD 3 6
TWO FOOT 1 8
WINTER OR STANLEY SHALE 3 7
TOP BEAMSHAW LOW BEAMSHAW OR STANLEY MAIN KENTS THIN 3 4 1 7 1 10
MAPPLEWELL OR KENTS THICK RIDING 2 3 1
2000
BARNSLEY, WARREN HOUSE OR TOP HARD 10 2
WORKED UNDER PERMIAN AT NOTTINGHAM, AND WHERE OAKS & WOULD HAVE BEEN AT DENABY BUT FOR SURFACE LEVEL AT CONISBRO' CLIFF HAVING BEEN DENUDED
BARCELONA 1 9
SWALLOW WOOD OR HAIGH MOOR 3
BRANCH 1
2500
LUDGATE 1 10
JOAN 1 11
FLOCKTON THICK OR DEEP SOFT 3 8
WORKED UNDER PERMIAN AT NOTTINGHAM
FLOCKTON THIN 1 4
FENTON THIN 3 5
PARKGATE OR DEEP HARD 5 7
WORKED UNDER PERMIAN AT NOTTINGHAM
3000
THORNCLIFFE THIN OR MIDDLETON LITTLE 1 10
WORKED UNDER PERMIAN AT WICKLEFIELD
CROMWELL 1 4
A LOCAL SEAM OF COAL NOT KNOWN IN THE WEST YORKSHIRE COAL FIELD
SILKSTONE OR MIDDLETON MAIN 4 10
WORKED UNDER PERMIAN AT CARCROFT
TOP THIN 1 4
WHINMOOR OR BEESTON 2 6
3500
LOWMOOR BLACK 1 4
LOWMOOR BETTER 1
FLAG-STONE
4000
HALIFAX HARD OR GANNISTER 2
FIRECLAY 9
HALIFAX SOFT OR COKEING 1
4500
MILLSTONE GRIT.
RINGING LOWE 2
5000
CARBONIFEROUS OR MOUNTAIN LIMESTONE.

WALTER ROWLEY,
MINING ENGINEER.
LEEDS.

proprietory, I think it possible that enterprising capitalists can be found to develop such vast resources.

With regard to the *lower* or *deeper* portion of our Coal fields, the longer they are left untouched, and the better it will be for us, for increased depth in working Coal will involve increased outlay in winning the same, which will result in increased cost to the consumer.

Interesting as the study is, of the exhaustion and probable duration of our Coal Fields, yet, as it is an unavoidable consequence of a great consumption, we cannot help its gradual exhaustion; let us, then, look more rigidly after what is left, and so tide off, to the latest possible period, the exhaustion of a mineral so essential to our existence as a great and flourishing people; for, should we ever be dependent upon importation for our supply, I think the evil day predicted by Mr. Stanley Jevons, in his exceedingly clever argument, will have arrived, when England will have to give way in its manufactures and commerce, to some country whose mineral resources have been but little broken into.

At the same time, it is not at all improbable when we think of what an age of discovery we now live in, and the increased light that a future generation may possess, that the use of Coal may be superseded altogether by some discovery in chemical science.

In conclusion, I would venture to hope that the friends of this Society will lend a helping hand to extending, somewhat more than hitherto, the acquisition of improved knowledge in mining operations, by giving such papers a larger share in its labours and researches; for, fascinating as geology is as a study, the commercial application of the science should never be lost sight of.

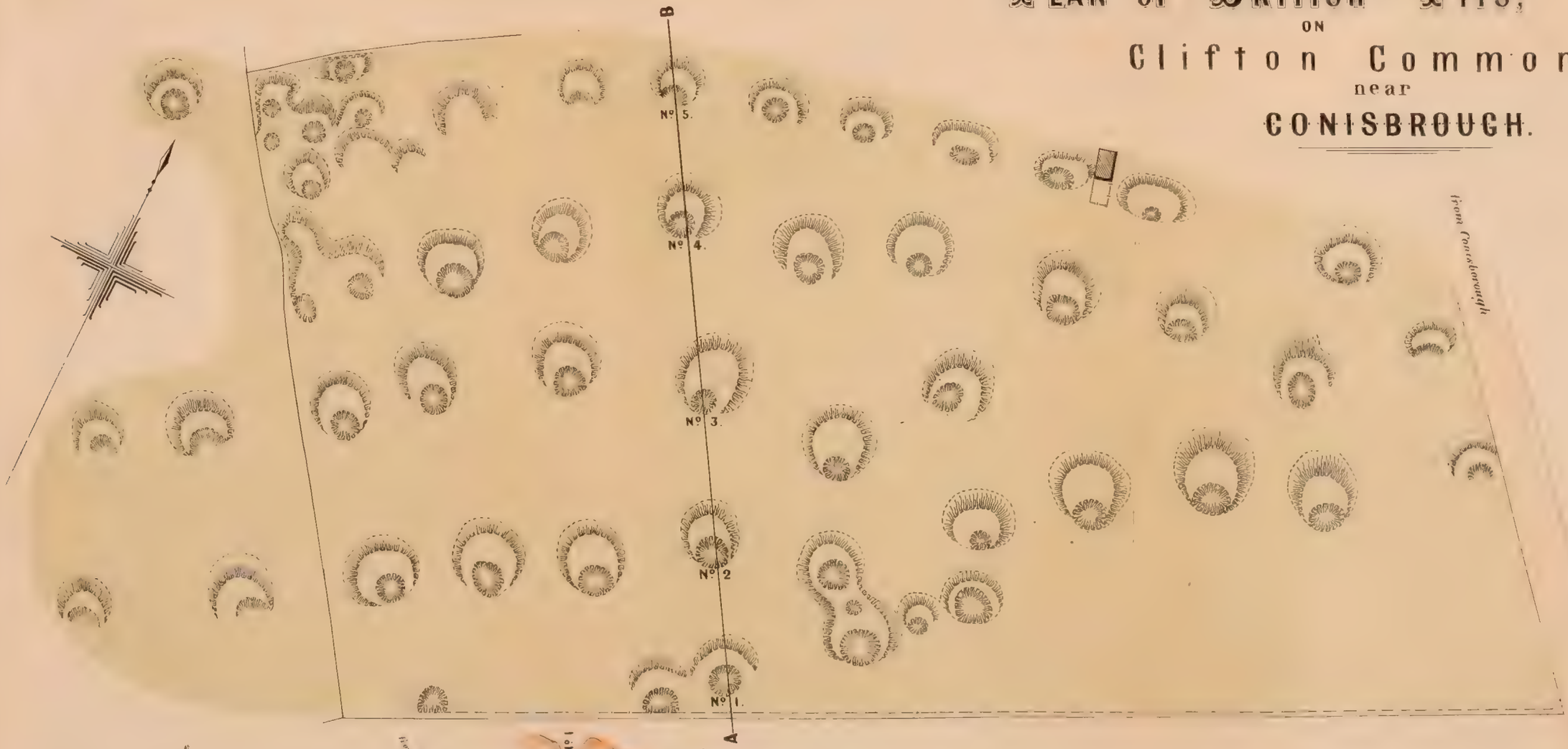
Papers would be very valuable on some of the details of mining, such as the various mechanical arrangements in use, including engines, safety hoists, etc., the relative merits of

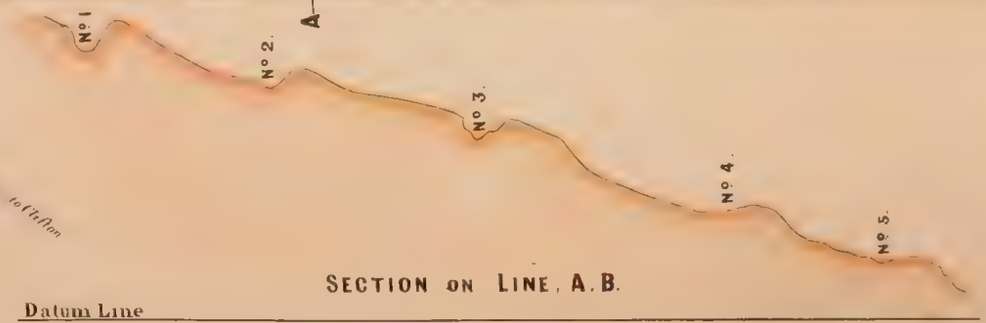
furnace and mechanical ventilation, Coal getting and Coal-breaking machines, safety lamps and explosions, and accidents generally, the lighting of Coal mines, and underground haulage, and any other information which either the geologist, chemist, or engineer has the opportunity of collecting, thereby mutually assisting each other in our efforts to mitigate, in every possible way, the commercial uncertainty and physical dangers which too often are associated with the subject the writer has selected on the present occasion.

BRITISH PIT DWELLINGS IN THE NEIGHBOURHOOD OF DONCASTER, BY THE REV. SCOTT F. SURTEES, M.A., SPROTBRO.

I am about to treat of a subject of interest to one and all—by some it would be called an era pre-historic—to point out to you how the earlier races who inhabited this island defended themselves from the rains and frost of this unequal climate, how they banded themselves together in tribes for mutual security and family life. I am about to speak of their dwellings, at a time when the wild beasts roamed through the vast forests of this part of the country; when the deer, and the wild boar, and herds of British cattle wandered in droves amongst heaths, woods, and marsh-lands. Professor Phillips' "Yorkshire," the highest authority we have, states as follows, p. 187: "We find the great Irish elk, the red deer, the fallow deer, the bos longifrons, the common ox, the goat, the sheep, the horse, the boar." Yet the tribes who inhabited these sea-coast districts were far from savages. They traded with their neighbours, bartered their commodities, they worked and smelted iron, they had metal rings for money, they had chariots and darts. Of the tribes of Britain one of the most important, if not the most important, were the Brigantes; the regions peopled by them

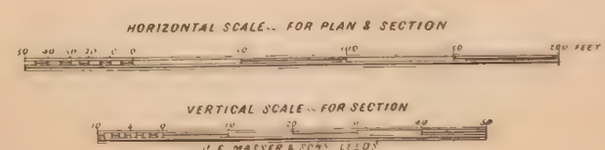
Plan of British Pits,
on
Clifton Common,
near
CONISBROUGH.





SECTION ON LINE, A.B.

Datum Line



stretched from shore to shore from the German Ocean to the Atlantic by east and west; the limit of their northern boundary we do not attempt to define, but their southern boundary would be most probably near by where now we meet. The "Maxima Cæsariensis" of after days, and the great North Humber kingdom, would probably be bounded by the same natural marks as the tribal borders of the older race. The Humber and the Don, the river line of boundary, would be carefully guarded, and a frontier fortress or encampment must needs be situate near, to watch the passes which the enemy must force ere he could cross the border and carry off the cattle or harry the natives of the frontier tribe. The great wath or ford by which the north could be reached from the south when the whole district from hence towards Humber-mouth was marsh and water-logged, would be the ford below Conisbro, where the Roman road, following most probably the British track-way, passes the shallows still called Strafford sands, "Strata-ford," the ford "par eminence" of the great Roman strata or street, which has never relinquished or lost its high-sounding name. Here then we should expect, if anywhere, successive races to keep watch and ward; here, if anywhere, traces should remain of the earlier inhabitants. They would most probably swarm along the rising ground which towers sharp and abrupt above the lowlands between Mexbro, Melton, and Conisbro. They would cluster round the limestone cliffs which overlooked and commanded the approaches to this ford. On either side the river, the hostile tribes must have an encampment and location. Strange, that the river boundary which separates tribes, and peoples, and nations, should ever and always be a source of contention and not of peace; that a mountain or valley line of frontier should lead less frequently to strife than the river which seems to us to flow a messenger of peace, and quietness, and amity. May it not be that even

the word "rivals" has its derivation or root from "rivus," and had its origin in this habitual tendency of the dwellers on river sides, as a normal state, to oppose and be at enmity one with another. The wave of conquest seldom surges over the hills and mountains, but too often breaks over and spends its force upon the river banks. Of what sort, and what is the description of these dwellings and these encampments? Are they found in Brigantia and elsewhere; if so, what are their form and situation? We have them in many different localities. Where the uneven formation of the ground, the ruggedness of the hill sides, a difficulty of levelling or adapting the soil for the purposes of cultivation, an open heath, or unenclosed common has hindered the breaking up of the fallow ground, they yet remain in considerable numbers. They are scattered up and down this Yorkshire of ours in many out-of-the-way nooks and corners, sometimes planted over, at others concealed by brake, heather, and underwood—yet by the careful observer they may be traced oftentimes where least expected. They are to be found in many places in Yorkshire, some of which I will touch upon presently. I have found them in hundreds round the coast of Norfolk. They are to be seen at Cadeby overlooking "Strata-ford," and in the woods near Sprotbro. They are in large numbers, clear and well defined at Cusworth, the stone embankment round some of them distinct, and one in particular with an entrance of stone built up, still clearly visible. They are in clusters, and seem to have had a communication, as if members of a family had a group of these pit-dwellings to themselves. There is at the further end of these dwellings (at Cusworth) a very large earthwork or barrow, called Castle-hill, and the ground near them is scarped, and earthworks are to be traced, not, it may be, on so large a scale as at Melton, where the whole cliff looking down on "Strata-ford" is terraced, but still clearly to be made out. I have noted

them in the woods of Stapleton, above the Went, where exists one of the most important and curious earthworks in the country.

The pit-dwelling or British camp I have to bring under your notice to-day, is, I believe, one of the most perfect and symmetrical in England. The pits are in parallel rows as if for defence as well as for habitation. It has a roadway running through it leaving a row of outer pits on the lower side. The site is singularly well chosen to command "Strata-ford." On the hill above is one of the most extensive views in this part of the country. Sheltered from the prevalent winds, in a dry locality, on the slope of a hill, with a brook running near to supply them with fresh water. The earth from each dwelling is thrown up in a horse-shoe form, to make a platform for the erection of the stakes or trees to cover their dwellings and uphold the roof of ling or turf, as well as a protection against the prevalent winds. There is such a roofed dwelling, which would give you a good idea of how this was done, in a charcoal burner's hut at Cusworth; I wish I could have got some one to make me a sketch of it. The circular form of these pit-dwellings appears to be that generally used by savages. Dr. Livingstone mentions that he found it impossible to teach the natives of South Africa to make a "square hut, when left to themselves for a few minutes they invariably reverted to the circle." All the earlier habitations of pre-historic times are either oval or circular. Pearson's History of England, and early civilisation, thus describes the dwellings of our own fore-elders: "The villages were circles of huts hollowed out of the hills or heath." Professor Phillips under the head of "Houses of the Brigantes" has as follows (p. 292): "The buildings were numerous, much like those of Gaul. The ground is excavated in a circular shape, so as to make a pit from 6 to 8 or even 16 or 18 feet in diameter, with a raised border, and

of the depth of 3 or 4 feet. Over this cavity we must suppose the branches of trees placed to form a conical roof, which perhaps might be made weather-proof by wattling a covering of rushes or of sods. The opening we may believe to have been placed on the side removed from the prevalent wind. In several places these pits are associated in such considerable numbers as to give the idea of a village: such are the Killing Pits on the gritstone hill, less than one mile south of Goodland Chapel, the pits in Harwood Dale, those which encircle Rosebury Topping, besides many on the side of Glaizedale and in other situations. But the most instructive in this respect are those which have been described by Dr. Young, on Danby Moor, between Danby Beacon and Wapley. Here the pits are in two parallel lines, bounded externally by banks, and divided internally by an open space like a street. A stream divides the settlement into two parts. There are no walls at the end of the streets. In the most westerly part is a circular-walled space 35 feet in diameter. (Also page 29, Ingleborough): "In this space are nineteen horse-shoe-shaped low-wall foundations about 30 feet in diameter, each ring-like foundation having only one opening which is always on the side looking south-east. They are evidently the foundations of ancient huts (Cyttian) each probably designed to be a conical or dome-shaped roof of heath or sod, "congestum cæspite culmen," with an opening turned away from the north-west, which is the quarter for violent winds and snow storms." Now is there any mention in ancient story of names or places which will enable us to identify this British camp? Geoffrey of Monmouth tells us that when Hengest was defeated, "The Saxons fled whithersoever their consternation hurried them, some to the cities, some to the woods upon the hills, and others to their ships, but Octa, the son of Hengest, made his retreat with a great body of men to York, and Eosa, his kinsman, to the

the city of Alclud, where he had a large army for his guard." Geoffrey had told us earlier of Ebracus building Kaer Ebranc and Alclud, mentioning them in the same paragraph (B. ii., c. 7.) Again: "Elidore and Artgallo are reconciled and go to Alclud" (B. iii., c. 18.) Alclud is spoken of clearly as in their territory, and in connection with York, and when Elidore's kingdom is divided, one-half is "from the river Humber westward," which would include this very district round Conisbro. Now as "creagh or crag" enters into names innumerable in Gaelic, so would "clud," which answers to, and is equivalent to it in British, meaning cliff or rock, be found common everywhere, just as the English word which took its place, "Clifton," is one of the commonest names of places in our language. Again, Robert of Brunne: "In the Nathe he made a city, Kaer Ebranc he called the town, another Aklud." We have also another account, Brut y Tysilio, which tells us when Hengest was worsted at Caer Conan (Conisbro), "a great number fled to a neighbouring fort, where they made a second stand." Roger of Wendover gives us the locality and name: this took place "near the river Don; that Octa reached York and Eosa took refuge in Alclud (p. 21). . . . Peace is made with Octa and Eosa, and they are settled on the borders of Scotland, 490, A.D. But in 498, A.D., when Aurelius is dead, "they break their league and invade the northern provinces of Britain, and destroy all the strongholds from Albania to York; at last as they were besieging Alclud, Uther Pendragon comes upon them"; clearly the narrative requires "Alclud" to be south after York. Here then, by piecing these different accounts together, and by painful investigation, we find that at a battle fought "upon the Don or Dune, near Caer Conan or Kunnigesburh" (Conisbro), there was a "neighbouring fort" to which Eosa retired. That fort was called Alclud. Alclud was in the territory of a prince

who ruled "*from Humber westward,*" and that when Octa and Eosa ravaged the northern country of Britain, coming from Scotland, Alclud is spoken of as after York. We then find a remarkable British fort still in existence, neighbouring to Conisbro, bearing the same name as Alclud anglicised into Clifton, and lying under Crookhill or "Craghill," as, spite of the spelling, it is still called in the dialect of the people. The British Alclud was surely at or near some great ford (this British encampment at Clifton overlooks the great Strata-ford or Strafford sands, from whence our wapentake of Strafford takes its name), for Taliesin, in his song of the winds, records Owen's defence of the flocks and herds of his province, and mentions his battle at the "ford of Alclud." It may be said that the Alclud of Bede seems to have been elsewhere, granted that it may be so; there are two Chalons in France, and it would be just as sensible to insist therefore that it was to Chalons sur Saone and not the neighbouring Chalons sur Marne that McMahon retreated to when worsted at Woerth. The one battle was fought not far from the Marne, the other not far from the Don, and that fixes the locality. As there are Cliftons many, so there might be Alcluds many, just as there are still numerous names in Scotland into which enter the composition of Creag or Crag.

In that interesting and well-written guide book, which I wish was on the table of every Yorkshireman, "Walks in Yorkshire," by D. S. Banks (see pp. 269 and 233):—"The country all around Egton Bridge is especially fine. The British village at the grange, lying in a corner, on the moor top, above the village of Delves and between east and west Arncliffe wood, has a like extensive prospect. The site of this, marked '*pits*' on the Ordnance map, and the road to it are fenced from the surrounding land. The enclosure may be said to represent roughly a figure of 8 with the centre line removed and two slits in

the ends for the road in and out. It is now perhaps 500 feet long and nearly as wide, but part was taken into an adjoining field some years ago. There are many scores of pits more or less accurately rounded, varying from 8 or 9 to 18 or 20 feet in diameter, and from 3 to 6 feet deep, having a space through the midst for the road. The village stands above the ground on all sides, so that no water could drain in, and on the south-west boundary and along part of the north-eastern face run banks apparently in part artificial, and outside the first a broad level as if made for a road or other purpose. The pits are not in rows but lie like irregular honey-comb cells separated by ridges sufficiently wide for a man to pass, and in some are signs of rough walling. It is remarkable that this old home should have remained thus undisturbed for so many generations—say 2,000 years. Native oak and ash trees of considerable size grow on the place, some rooted into the foundations of the huts." Also p. 234: "Taking note of land-marks I struck over the moors for the ancient British settlement lying a mile north of the beacon hill on a ridge between two feeders of the Staithes beck. The plan of this village differs much from that of the settlement at Egton grange. There the huts stand almost close together, and not in regular order; here the pits are in parallel lines, two rows being enclosed within banks of earth. The pairs of rows are three in number, each containing thirty or more houses, or about fifteen in a row. The pits measure about 10 feet in diameter, and lie from 15 to 18 feet apart. The passage or street between the lines is about 24 feet wide, and the enclosing ridges lie almost close to the outside of the rows."

But you will say, how came these pits to have been so long undiscovered? My attention was caught some time since, as I passed in the distance, by a number of singular hollows on the hill-side, visible to the right on the road from

Conisbro to Crookhill. It had been common until recently, and the brake and the ferns which had grown over it had been removed. On closer examination I found these hollows were not natural on the surface, but ranged on a carefully devised plan. They were exactly similar in shape, and situation, and size to those I had met with in other places. Fortunately these interesting relics of other days and an earlier race had fallen to the lot, in the enclosure award, of a gentleman whose family residence is close at hand; by his permission I have had them accurately surveyed and laid down upon a plan and a scale, and am able to produce to you this thoroughly well-executed drawing from your townsman Mr. Brundell's office (see plan). The pits laid down upon the plan are in number about fifty, but there are existing besides, the traces of many others in the grass fields which border on Clifton common. These pits are of a circular form, from 12 to 20 feet in diameter. This transverse section shews you how they lie on the side of the hill; you are to suppose a trench driven through it and you standing looking on the divided section. These fields were in the memory of man thickly overgrown with wood, and old Sherwood as we all know, with its yew, and its holly, and its oak indigenous to the soil, ran along this district, photographed in our memories in the opening pages of Ivanhoe, and linked by the same story to our boyish recollections of Walter Scott, beginning: "In that pleasant district of merry England which is watered by the river Don, there extended in olden times a forest covering the beautiful hills and valleys which lie between Sheffield and the pleasant town of Doncaster." The name of the settlement is retained literally translated into our English language by a word common everywhere, Clifton, or town of the cliff, and the older form of Gaelic, or its kindred dialect Celtic; "Crookhill," still holds to the earlier word "crag." There is a singular witness here to the value of

local nomenclature—two Gaelic names being yet found in juxtaposition. The field at the junction of the brooks is yet called Aber-skills (we have Skellbrook also in the neighbourhood). Volumes have been written on that word Aber and its meanings, so seldom found retaining its hold on the English speech, yet so common in the neighbouring Scotland. Now I have to bring before you a singular instance of persons arriving at the same conclusions from different premises. I confess it was with no common satisfaction I one day received the following letter from a stranger who had been employed in the Government Geological Survey.

"Belmont, Monk Bretton, Barnsley,
April 25*th*, 1868.

"Sir,

I take the liberty of writing to ask, whether in the course of your antiquarian researches you have visited Clifton common, near Conisbro. Part of the common has been enclosed and brought under cultivation, and while walking across it yesterday, my colleague Mr. Holmes picked up a flint flake; half an hour's search gave us four or five more flint flakes, about which there could be no mistake, and some fragments of rude pottery. I do not know whether in addition to your antiquarian likings you care much about these pre-historic remains, but if this is the case, I shall be very happy to show you what we found, and to act as guide to the spot. I should also be very glad to learn whether you have heard of any such remains being found in the neighbourhood before.

"I am, Sir,
"Yours obediently,
"A. H. GREEN."

Some time elapsed before Mr. Green was able to fulfil his promise. I wrote to him for fuller information, and I received from him the following most interesting letter:—

"28, Jermyn Street, London, S.W.,
February, 17*th*, 1870.

"My Dear Sir,

I am very sorry that I let the whole of last summer pass without seeing you, but official business kept me so close at work

that I could never find a day. I now enclose a tracing from the Ordnance six-inch map of the district, showing the field where the find occurred. We picked up some half dozen small flint flakes, and lots of rude pottery. There also seemed to have been iron smelting going on in the same field, for there were slags lying about. The sandstone of which the field is formed is very ferruginous, and contains nodules of impure hæmatite, and was probably itself smelted as an iron ore. I will on my return take the earliest opportunity of calling on you.

"Yours faithfully,

"A. H. GREEN."

And since that he has kindly taken the trouble to come over to Crookhill, and to point out to Mr. Woodyeare and myself the spot where this find was made. (Marked A on the plan.) Now first, this coming together of ironstone and slag. It is well known that iron-smelting tribes, as they yet do in India, extract iron in a rough way from charcoal furnaces, perforated with holes to make a blast, in the hill side. I told you that I had visited in Norfolk the famous Weybourne pits. There remain on the cliffs between Cromer and Weybourne, dwellings, in number about 1,000. There are, close by, heaps of scoria (here are some pieces of slag which I brought from thence, where they may be collected in quantities). How satisfactory to find that it is the same in appearance, and has evidently undergone the same process, as that in the vicinity of the pits in this neighbourhood; Yorkshire and Norfolk alike giving up for our comparison these evidences of the iron age, to teach us how the old inhabitants of this Britain could and did extract iron from the stone, and smelt the ore with which they made their chariot wheels, when they drove them down from the cliffs to discomfit Cæsar's hosts, and how they procured and worked that iron which they formed into rings and used as current coin. Secondly, Mr. Green's interesting letter informs us of his find, in the fields above the pits, of these flint flakes. In the first number of the Yorkshire Archæological and Topographical Society's Magazine, you

will find a valuable paper, with illustrated specimens of arrow points, &c. Those found by Mr. Green are similar to these I now point out to you; but I am enabled to produce to you to-day, this remarkable specimen of a flint-agate-arrow head which was recently brought me by my nephew, Mr. Chaworth Musters, R.N., from the interior of South America; it was picked up amongst the *débris* at a burial place of an extinct tribe, in the valley of "Rio Negro," 400 miles from Buenos Ayres, bones and skulls were lying near. This gentleman has but lately returned from an extraordinary sojourn amongst the native tribes of central South America, and has gone with them from sea to sea. He has lived amongst them for more than a year, adapted himself to their ways and customs, hunted and been with them as one of themselves; he has studied them in their expeditions and at their homes, and I venture to say that when we have the account of the careful observations of this enterprising Englishman before us, we shall learn much that is new to us of the habits and customs of these wandering tribes, and by analogy, of the pre-historic races of this land. The people who used these arrow heads, one of which I show you to-day, are as a race extinct, or else exist only as an inferior and degenerate one in the extremity of South America, "Terra del Fuego." The races that occupy the hunting grounds formerly inhabited by the flint-arrow-head using natives, are those who use not the flint-arrow head but the stone. Lieut. Musters told me that although in their travels they are seldom, if ever, stationary; they made for and encamped for several days in a district where material suitable for stone implements was plentiful. The whole party were employed upon this work, and he showed me some made and fashioned by them whilst there. They use no iron implement to shape them, but tool them by working or hammering them with another stone. They are beautifully

finished, and used from a sling to bring down with an unerring blow the object at which they are aimed. Two points of deep interest I think are suggested from his experience and research: first, the stone-using people are distinct from the flint-using race; secondly, that the stone people are of a superior and higher grade, and have actual possession of the hunting grounds which the flint-arrow-head tribes formerly occupied, and are in intelligence, skill, and physical appearance far in advance of the Terra del Fuegian. Mr. Chambers, of Cleugh-House, has in his possession a remarkably fine specimen of a flint chisel or hatchet (so-called). Lieut. Musters however informs me that it is just such an implement as the Patagonians use for scraping and thus softening the hides they use for clothing.

I think we have here as remarkable a spot as can be found in Yorkshire: a perfect British village or encampment on the confines of Brigantia. We have the Gaelic "Aber," (see plan) or confluence of two streams, telling us of the earlier race who inhabited this district and gave names to the rivers Calder and Dun near by. We have another Gaelic word retained in Crook or Crag-hill. We have the change of name from Alclud to Clif-ton. We find the green-stone hammer, the flint instruments, the iron slag similar to the scoria and same in quality and appearance, and evidently subjected to the same process of smelting as the slag brought by myself and shown to you to-day from the British pits on the cliffs from Cromer to Weybourne. Strange that so many centuries after, local nomenclature should tell of the earlier races; and British pit-dwellings, found everywhere along this southern boundary of the Brigantes, should challenge the sceptic to say whether seeing is believing.

PAPER ON CERTAIN ROMAN ROADS IN YORKSHIRE IN USE AT THE PRESENT DAY. BY MR. FRANCIS A. LEYLAND, OF HALIFAX.

In the summer of 1861 I read, before the West Riding Geological and Polytechnic Society, an essay on the Roman roads which intersected the parish of Halifax. In that essay I set forth the difficulties which had beset the investigation into the origin and history of the Roman Iters of this county in general. They were such as to discourage, at the very onset, any further inquiry into questions vexed by so many doubtful theories, contrary opinions, and aimless courses. Learned dissertations had been written from time to time, and the names of Camden, Burton, Gale, Horsley, the two Whitakers, Watson, and Hunter, gave sanction to theories which later investigations have proved, in great measure, to be unsound and valueless. But the learned author of the Deanery of Doncaster is persuaded that a great revolution in the Roman topography of this part of the kingdom will yet be effected.* To accomplish this, it will be necessary to lay down fixed and certain principles from which there can be no appeal. To these we must rigidly adhere, without regard to former theories, excepting what may be cited from them in corroboration of the certitudes which these principles and rules evolve. We must mark upon an accurate map the sites of towns known to have been of importance in Roman times. Between these we must draw straight lines over the districts they cross. Thus guided, we must search near them for ancient and long-beaten tracks on which the countless footsteps of past generations have trod. To these we must find attached, along their courses, names indicative of an existence, at least, in Roman times. Upon these roads we must look for ancient towns which have from

* Additions and Corrections to Deanery of Doncaster. Vol. 1, p. vii.

time immemorial been the regular stages of days' marches from each other. In some of these we ought to find fixed and heavy remains of the Roman period, such as all altars hypocausts, baths, tiles, and inscribed stones are admitted to be. But in some of these towns such undoubted evidences may be wholly wanting, and this will arise from the fact that every town and village in Brigantia was not occupied by a permanent Roman garrison; yet their existence in Roman times will be equally certain. Most of these places were inhabited by British populations alone, but under the Roman yoke. We are informed by the elder Pliny that the houses of the Britons were of timber, and were roofed with slates or thatched with straw. He, indeed, says that the Britons were celebrated for the ease with which they separated the laminæ of the flag-stones for the roofing of their houses. Such centres of the native tribes never received the impress of the Roman occupation, except when made into military stations. We must look for this impress in the garrison towns on the military Iters, rather than in the native villages of vicinal and British ways. Of the former, one or two instances may be briefly adduced. A road, which is the seventh Iter of Richard, extended from Ribchester, the Reregonium or Coccium of the Romans, to York. The distance between these two important strongholds was over seventy miles, and was divided into four stages. The first terminated at Colne, where the name of Castercliffe, with its remains of earth-works, and the discovery near them of the silver and copper coins of Gordian and others, found in a silver vessel, point out the site of the Alpes Penninas of Richard, and the Calunio of the Ravennas. The second stage was at Ilkley, the Olicana of the same Itinerary, where the second cohort of the Lingones was stationed, and where inscribed stones have preserved the names of two of its commanders, Claudius Fronto and Cæcilius Lucanus. The third day's march

ended at Aesica, the present Netherby, where the first cohort of the Astures kept watch and ward, and where the remains of important works constructed by them have been found. Aesica, although a very necessary post on this road, is omitted from the Itinerary of Richard. According to this authority, the destination of the road is Eburacum: but, on reaching Olicana, he takes it above twenty miles out of its course to Aldborough, and thence down to York. There can be no doubt that a road, and probably a British one, extended between Coccium and Isurium; and that the Iter to Netherby and York was a divergence from Ilkley, and was Roman.

The discrepancies in both the Itineraries lessen their value, in the presence of the ancient Iters which can be pointed to as still, for the most part, in use at the present day. Such was the reliance placed on these venerable authorities, that every imaginable scheme was devised to reconcile their errors and omissions with existing facts. It is evident that these Itineraries, to which I may add the Ravennas, have not escaped the mutations of time; and that, on this account, they add little to the information that can be well obtained without them—so far, at least, as that relating to the roads which intersect this part of the country.

The fourth stage upon the seventh Iter terminated at Eburacum, the garrison of the ninth and sixth legions. There were on this Iter five strong places; and at four of them inscribed stones and fixed remains of the Roman times have been discovered. The exception is at Colne; but the opinion will scarcely be disputed that, although these conclusive evidences are not known to have been met with there, it was equally held by a Roman garrison, the name of which has perished. Another example of a military way is found in the second Iter of Antonine and the sixth of Richard: a road which extended from the Wall to York and from York

to Chester. As the distance between the two latter places was about the same as that between Ribchester and York, it was also divided into four stages. The first of these terminated at Leeds, which, in another place, I have demonstrated to be the site of the missing station on the second Iter of Antonine, and to have been distinguished, in Roman times, by the name of Loidanum. The designation is derived from the Gaelic "LEIOD," a wide expanse, and is preserved by Bede and Alfred. The former speaks of this stage as being placed "in regione qui vocatur Loidis;" and the latter as "tham lande the LOID is haten." The name is preserved in the Ravennas as that of a place, amongst others, situated in a part of Britain which is narrowest from sea to sea, namely, that portion of the island extending from the Humber to the Tyne, and narrowed by the encroachments of the German Ocean and the Irish Sea. The second stage was at Slack, in Longwood, where important remains of its Roman garrison have been found, and where the fourth cohort of the Brenni held their fortress on an elevation midway between Eburacum and Deva. The third stage ended at Mancunium, the present opulent town of Manchester, where, on the authority of lapidary inscriptions, the first cohort of the Frisians was stationed. The march on this Iter terminated at Chester, the garrison of the twentieth legion. It will be observed that the first stage from York on the second Iter, like that of Colne from Ribchester on the seventh, is destitute of those remarkable *indicia* which reveal the Roman lineaments that have been impressed on all the other stations of the two military ways to which I have briefly alluded. I venture to believe that as Loidanum stood in the same relation to the other military posts on the second Iter as Calunio did on the seventh, and as at Leeds, Roman earthworks, a *trajectus* over the Aire, as well as other evidences have been met with, the claim of Leeds to a Roman position will scarcely be disputed.

Upon the two Iters just alluded to, including their *termini*, we have no fewer than ten towns, seven of which are known, on indisputable evidence, to have been occupied by Roman garrisons. But, if we add to these Danum and Legeolium—both situated on the Ermine Street, a road which appears to have formed the eastern boundary of a military cordon drawn round an extensive portion of the West Riding, extending to the chain of hills that separate the counties of York and Lancaster—we increase the number of well-known Roman strongholds in this particular district. From the presence of so many Roman garrisons within a comparatively short distance from each other, there can be no doubt that a large and warlike native population was located in towns and villages within their confines. In these places, although they had become Roman passage towns, there would, as a rule, be nothing to indicate the Roman occupation, except it might be the circulation of Roman money. It is extremely probable that, for the most part, the very towns in which the conquerors placed garrisons had been British strongholds in times anterior to the landing of Cæsar. We have, in actual existence and still used, a *via vicinalis* extending between the two military roads already alluded to, and of equal antiquity, at whose intermediate stages no evidences of Roman occupation are known to have been found. This road led, or still leads, from the town in which we are assembled to Ribchester, a place of great importance in Roman as well as in British times. It is apparent that garrisons were unnecessary at the intervening stages on this road, seeing they were well watched from the fortresses on the second and seventh Iters, which ran, for a great distance, parallel to it,—hence the absence of those remarkable *indicia* which usually distinguish the towns that were held by Roman military forces. It is not improbable that the vicinal way under notice was laid down about the time of the Roman invasion. We are

informed by Whitaker, of Manchester, on the authority of Richard and others, that, some time about the commencement of Christianity, the Brigantes invaded the territories of the Sistuntii and the Voluntii: the latter inhabiting the mountains of Westmoreland, and the former the plains of Lancashire. The principal town of the Sistuntians was Ribchester. The two confederate tribes were subdued by the Brigantes, and became a united body against the Roman invaders. It is, therefore, extremely probable that the way between Doncaster and Ribchester was constructed by the Brigantes about the time of their conquest of the western tribes. On the great North Road, which extended from Lincoln to Alborough, we have, as one of its intermediate posts, Danum, the present Doncaster, in Roman times second only to Eburacum in importance in the East Riding. It was here that a Roman force was established; and where, also, the præfect of the Crispinian Horse commanded. From this post the way to Coccium led along the Roman Rig by Adwick-in-the-Street to Robin Hood's Well; and, beyond this spot, at a distance of some two miles to the north-west, inclined still more considerably to the west. Passing Thorpe Audlin and Ackworth Grange on the left, the road diverged from the line to Pontefract at East Hardwick, whence it appears to have passed over Castle Syke Hill and on the present bridle stye to Purston Jacklin, where it entered the road to Wakefield. From Purston Jacklin the way passed Street House, High Street, and Hell Lane, to the first stage on the journey to Ribchester. At Wakefield, no fixed Roman remains have been found—at least, of which there is any record—nor even Saxon, although at the compilation of Domesday it was the capital of an extensive manor to which it gave its name. The comparative nearness of this place to the great military centres of Eburacum and Danum, and, we may add, the proximity of the Roman town of Legeolium,

would alone render a garrison here unnecessary. At Wakefield, the Iter throws off a branch to the north-west, by Carrgate, East Hardsley, Upper Street, Tong Street, and through Gildersome to Bradford: thence to Colne, a post, as we have seen, on the seventh Iter; and it may also have connected Doncaster with Ilkley. The road from Wakefield to Ribchester is continued by Hag's Lane End and Ossett Street Side to Dewsbury. No fixed remains of the Roman times are known to have been found here; but my late valued friend, Dr. Fearnley, the first Mayor of Dewsbury, told me that, some time before, there had been disinterred by the road side near this place a stone well—and this may have been a sarcophagus—in which were found two Roman bronze spear heads, and a drinking cup of the same material. This information was given me on a public occasion, and my friend dying shortly after, I never had the opportunity of examining the relics myself, or of ascertaining their whereabouts. Should this allusion meet the eye of their possessor, I should be glad if he would communicate with me. It happens, owing to the introduction of Christianity here, that the antiquity of Dewsbury is carried back to within a comparatively short period of the departure of the Romans; for, some four hundred and fifty years before the conqueror's survey, St. Paulinus preached, and celebrated the "Heavenly Mysteries" (*sic Beda*) on the banks of the Calder, which flows past the ancient town. From Dewsbury, the road ascends by Upper Boothroyd, near which two Roman querns and some Roman coins were discovered in digging the foundations of a house. The querns are in the possession of Mr. James Nowell, of Halifax. From this spot, the Iter passes Heckmondwyke and Liversedge, two ancient locations, the latter being surveyed in Domesday. From this place the way crosses Hartshead Moor, where it intersects the second Iter of Antonine; and, descending Birkby Lane, crosses the

brook at Bailiff Bridge, whence it ascends to Lightcliffe, in the parish of Halifax. Here, between the years 1828 and 1831, in a field opposite Lightcliffe Chapel, and within a few yards of the ancient way, there was found, in a Roman vessel, a large and valuable hoard of Roman coins. After a good many had been broken by the man who found them, to ascertain if they were really silver, and had sold others, a large number fell into the hands of the Rev. W. H. Bull, then incumbent of Sowerby, in the parish of Halifax, and now vicar of Billingshurst, Horsham, Sussex. There were, amongst them, four gold British coins — two of Queen Boadicea—and one very beautiful and rare, not found in any known work on British and Roman coinage. There were also twenty-six consular coins, and five imperial, all of silver. The consular coins had been much used and defaced, many having had stamped upon them small initials and figures, in the same manner as idle people disfigure the coinage of the present day. The imperial coins were all of Augustus, except the last, which was of Caligula. In addition to these, there was subsequently dug up in the chapel yard a silver coin of Scipio Asiaticus; and, a few years since, at a collection at Lightcliffe for some charitable purpose, there was found in the alms-box a fine copper coin of Allectus. Leaving Lightcliffe, the road enters Hipperholme, where, at Hove Edge, near our road, Dr. Richardson informs us, in a letter to Hearne, that "there were divers large copper medals found at Hove Edge, within the township of Hipperholme, in a thick glass vessel." He tells us that he had obtained some of Dioclesian, Allectus, and Carausius, and suspects that there were others which had been dispersed before he had intelligence of them. (Leyland's Itinerary, vol. 1, pp. 142, 145.) The road descends from Hipperholme by Barrow Clough Lane; whence, having ascended by a deeply-worn and once-paved road, overshadowed with trees, to the top of the hill

which overlooks the country that lies between it and the Pennine chain, the Iter descended by a road, until lately paved in some parts with huge blocks of stone, to the termination of the second day's march from Danum. We have now reached Halifax, a post midway between Doncaster and Ribchester, and occupying geographically the same position on the present road as Slack on the second and Ilkley on the seventh Iter; and, at the same time, intersected by a road between the two latter places. Here, on an extensive plateau, overshadowed by a range of lofty hills to the east, at the base of which flowed a limpid brook, stood this important post on the Iter we are pursuing. Owing to its proximity to the military station at Slack, with the northern outpost of that place at Thick Hollins, in Greetland—both which could be surveyed from the hills at the base of the town—a garrison here would be wholly unnecessary. On this ground alone, the absence of fixed Roman *indicia* from Halifax may be satisfactorily accounted for, even though it was a place manifestly coeval with the Roman posts by which it was surrounded. Leaving Halifax, the way ascends to High Road Well and Camp End, in Warley; where, passing the site of an important discovery of cinerary urns in 1848, it crosses the Iter from Ilkley to Manchester at Newlands Gate. From this point the road traverses the ancient hamlet of Luddenden; and, ascending to Midgley, passes near Old Castle and the circular British encampment on the hill above. From the high ground of Midgley, which commands a grand view of the surrounding country, the way descends by Wadsworth Lanes to Hebden Bridge and Mytholm: whence, ascending the sudden steep of Rawtonstall—once a midway village, now entirely gone—by a zigzag-paved road, the way is continued by High Gate, Lane Head, and Blackshaw Head to Keb Coat and Hawkstones: thence forward to Stiperden. Passing Stiperden Cross, the ancient way, of which traces

may still be seen, intersects the boundary line of the counties of York and Lancaster, and ascends to Duke's Cross: whence, passing Maiden Cross, it reaches Mereclough, in the parish of Burnley, where, in the year 1695, Roman money, consisting of fine consular medals, was found. There was also discovered in the immediate vicinity of this place, about the year 1765, a glass vessel, full of the small brass coins of Constantine the Great and Licinius.* From Mereclough, the road reached Burnley, the termination of the third day's march. Here, Roman coins and other *indicia* have been found. Dr. Thomas Dunham Whitaker says:—"The discoveries of Roman remains about the place are abundantly sufficient to prove the town to have been a settlement of that people upon a vicinal way, though neither fortified nor garrisoned, and therefore unrecorded in the itineraries." (Whalley, p. 321.) He is of opinion that Burnley occupied a position nearly midway, and almost in a direct line between Ribchester and Slack, and maintains the necessity of a means of communication between the two places on account of their importance. Of this supposed vicinal way, although I know the country well, I am unable to say anything. There does not appear to be any reliable evidence on which to base the theory. Dr. Whitaker alludes to the discoveries at Mereclough as being at the "commencement of the Long Causeway." But this Long Causeway leads direct to Stiperden, and to the route over which we have brought the Iter from Doncaster to Burnley. From the latter place, the march terminated at Ribchester, once a Roman city of the highest importance. Not only was it found necessary to connect by excellent roads—roads so direct and durable as to be generally in use at the present day—such fortified places as Eburacum

* Ducatus—MUSÆUM THORESBYANUM—p. 1, Foot-note by Whitaker, and p. 8 of the Catalogue. *Ibid.* Edit. 1816.

and Deva, Danum and Coccium, where the victorious legions of imperial Rome were quartered for many generations, but even the garrisons of cohorts were frequently connected by vicinal ways. Such were the roads from Mancunium to Olicana, and from Olicana to Cambodunum. Throughout the lines of these ancient ways we find that the name of "Street" perpetually recurs; and this quite as frequently on the Iters undistinguished at their intermediate posts by fixed Roman remains as those which have them. Between Purston Jacklin and Bradford on one hand and Dewsbury on the other, this name is repeated five times, although the streets run between places which have never been accounted Roman at all, notwithstanding, their geographical positions in relation to each other, prove them to have been coeval with the streets themselves. Before closing these remarks, I will ask your attention for a few minutes longer, while I mention another Iter, the accounts of which have been much perplexed. Warburton, the Somerset Herald, who published a Roman map in 1753, was a native of Lancashire. His natural taste led him to the study of Roman history; and observing many *itinera* with ancient pavements for the most part unaffected by time or tread still existing in the region of the Pennine chain, he bestowed great labour in the investigation of Iters which were shortly destined, in many places, to be enclosed, diverted, or made into turnpike roads, and in some instances to be wholly obliterated. One of his Iters, which is more intimately associated with those I have already mentioned, is that which he traces from Manchester to Ilkley. But there are errors in this particular survey which have misled such authorities as Whitaker, of Manchester, and Watson, of Halifax; and which put Dr. Thomas Dunham Whitaker to a pause: for he makes but the slightest mention, in his "History of Whalley," of such a road being in existence. This author ought certainly to have investigated a subject worthy

of the attention of Horsley and others, in his "History of Craven," under Ilkley, of which he treats; but upon this Iter, both in his Craven and his Loidis, he is silent. Warburton lays down his road from Manchester to Rochdale, Littleborough, and Blackstone-edge: thence through Soyland, in the parish of Halifax, to the *west*, not east, of Sowerby Chapel, as he has written it. From Sowerby he takes the road to Newlands Gate, where it intersects the Doncaster and Ribchester Iter. Leaving Warley on the east, and Midgley on the west, the herald seems to have gone in the direction of Cold Edge; but, before reaching that elevation, we find him suddenly describing a distinct road, some three miles to the east of his course, which also led to Ilkley. This was in the township of Ovenden, where he informs us that the road had Illingworth on the west and Shay Lane on the east. From this place he takes it onward to Ilkley. There can be no doubt that, on the preparation of his map for publication, his notes relating to these Iters became confused, and that he substituted an account of the Ovenden road for the one which passed over Cold Edge. After the map had been issued, and when it was too late, Warburton discovered the hiatus he had made on the *via vicinalis* which he had brought from Manchester to Newlands Gate; and, in a note which he entered in the Harleian MSS., he corrects the error by bringing the way from Ilkley over Rombold's Moor, Morton High Gate, Hainsworth Shaw on Harden Moor, Ellarcar, Denholme Edge, Foreside, Hunter Hill, Cold Edge, and a little to the east of Midgley, that is, Newlands Gate, the point which he left for the Ovenden road. This memorandum of Warburton's was unknown to the Whitakers, Watson, and others, and their respective accounts of the two roads are confused or nullified by the original error. The fragment of Roman road noticed by Warburton in this singular manner as passing between Illingworth and Shay Lane, in the town-

ship of Ovenden, was a vicinal way from Ilkley to Slack, which left the Iter last described at Foreside, near Denholme, and was continued by the Long Causeway—through Ovenden, as mentioned by Warburton—and thence to Slack. A portion of this Iter was, a few years since, still remaining, and is shown on the Six-inch Ordnance Map, No. 215, as the "Old Packhorse Road."

Such, then, is a hasty and incomplete outline of a subject on which so much has been written, and of which so much remains to be told. It is a question not so obscure as has generally been supposed. Most of the *itinera* improved or constructed by Ostorius or Agricola have been in use ever since, and constitute the turnpike and packhorse roads of the present day: such, for the most part, as those I have already mentioned. The time at our disposal will not allow me to trespass further on your attention, yet I may be permitted to observe that, although history is sadly silent on the important and stirring events which necessarily accompanied, at frequent and sudden intervals, the subjugation of this province—we may see, in the vast military operations taken on the roads to which I have alluded, that a continually impending resistance existed somewhere within or about their confines, that rendered these costly and formidable defences necessary. It is not improbable that, by judicious explorations along the ancient thoroughfares, at those intervals where human nature rested, after long travel, in days remote, as it does in these, inscribed stones and other relics may yet be found to throw still more light on the history of the Roman transactions in this province of the old Brigantia.

REPORT OF THE PROCEEDINGS

OF THE

GEOLOGICAL AND POLYTECHNIC SOCIETY

OF THE

WEST-RIDING OF YORKSHIRE,

1869.

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